Egyptian pioneer school

2024/2025

Science Preparatory 3



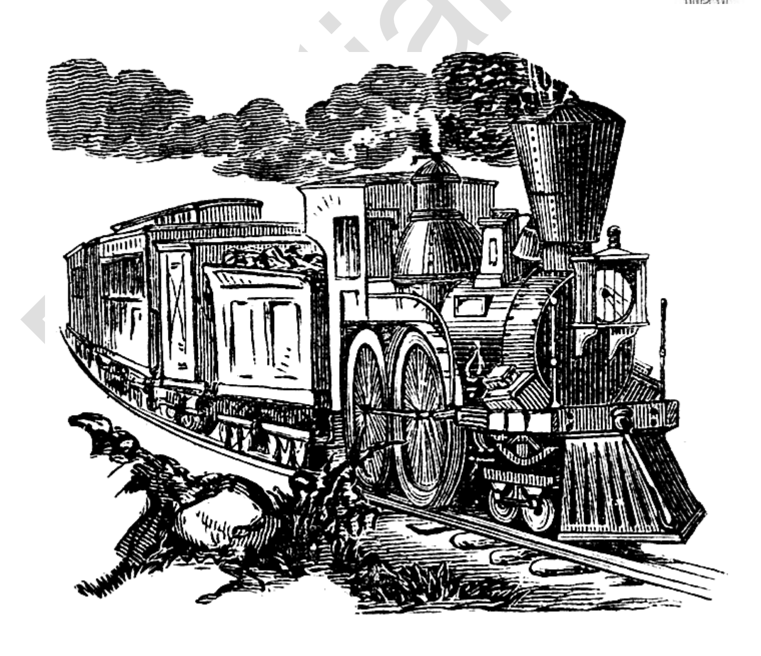
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Student name:
Class:

Unit 1: Forces & Motion

- **Lesson 1: Motion in one direction**
- **Lesson 2: Graphic representation of motion in one direction**
- **Lesson 3: Scalar & vector physical quantities**





Lesson 1: Motion in one direction



❖ **What is meant by motion?**

Motion is the change of the position of a body as time passes relative to fixed point.

- **To simplify motion we'll consider motion in one direction.** One example is the motion of a train on a straight track. The train moves either forward or backward along the track. It can't move left or right or up or down.
- The train is moving in a straight line because its path is straight.
- **Motion in a straight line is the simplest type of motion**.
- **To describe and compere the motion of object we look at their speed**

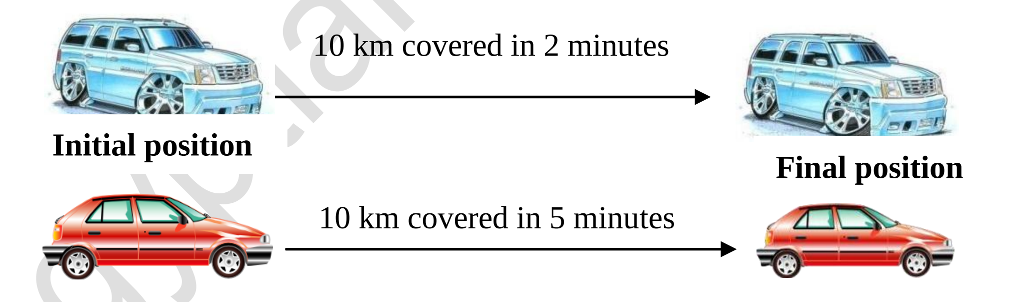
Speed

The distance moved through a unit time.
Or.
It is the rate of change of distance.

What are the factors which affect speed?

Consider the following: Two cars are moving on the same path. The 1st car covered 10 km in 2 minutes while the 2nd car covered the same distance (10 km) in 5 minutes. Which car is faster?

The 1st car is faster because it covered the same distance in a shorter time.

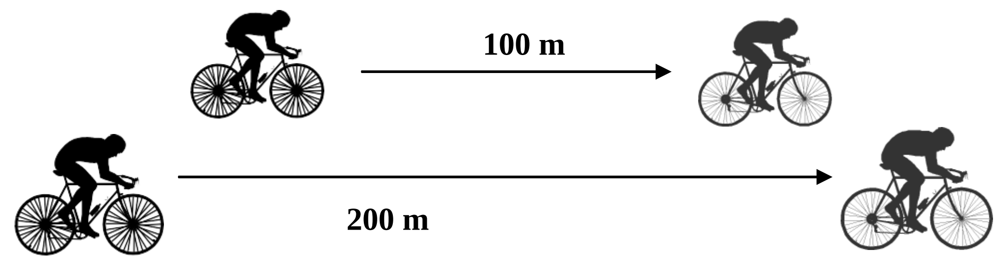


Two objects moving with different speed cover a certain distance in different intervals of time. The object which spends the least time has the biggest speed.

Consider the following: Two persons are riding their bikes along the same path.

- The 1st biker covered 100 m & the 2nd covered 200 m. Both took the same time.

- Which one has the highest speed?



- The speed of the 2nd biker is bigger because he covered a bigger distance in an interval of time equal to the 1st biker.

Conclusion:

The speed of the moving object depends on 2 factors: a. the distance covered b. the time taken.

Speed is the distance covered in a unit time

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{d}{t}$$

Note: The units of speed are km/h or m/s

Enriching information:
1 km = 1000 m
1 hour = 60 minute
1 minute = 60 seconds
$$\text{Speed km/h} \times \frac{1000}{60 \times 60} = \text{speed m/s}$$

How to change the speed of unit km/h to m/s. Speed km/h x 5⁄18 = speed m/s.

- ❖ Example speed of 72 km/h = 72 x 5/18 = 20 m/s.
- ❖ Example speed of 20 m/s = 20 ÷ 5/18 = 72 km/h.

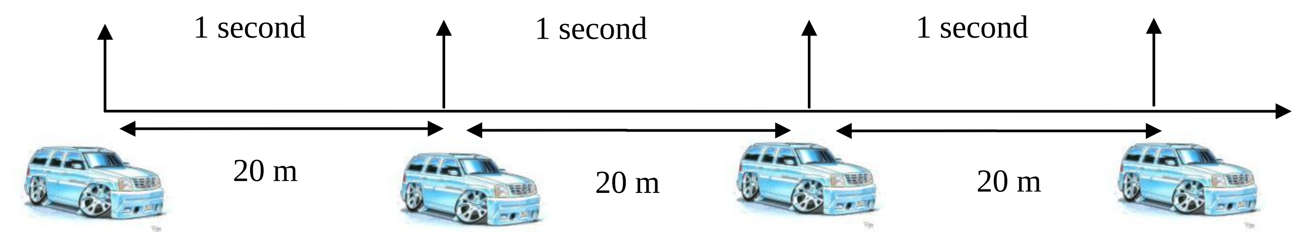
Types of speed:

Uniform Speed = Regular Speed

The speed of an object is uniform if it covers equal distances in equal intervals of time.

An Example:
The car in the figure covers 20 m in the 1st second & 20 m in the 2nd second

& another 20 m in the 3rd second.



Cars & planes are provided with counters such as

<u>Speedometers</u>, the speedometer identify the speed of the car or plane during navigation.

Speedometer mileage



Gas

Activity : How long does it take sun light to reach the earth?

The distance between the sun & earth = 149×10^6 km Light travels at regular (constant) speed = 300,000 km/s

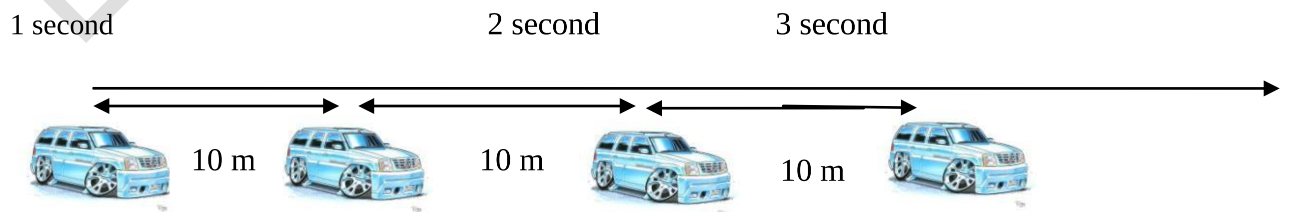
Speed of light = distance ÷ time Time = distance ÷ speed of light

Time = 149,000 ÷ 300,000 = 496 s
496 ÷ 60 = 8.17 minutes = **8** minutes & **17** sec.
Therefore if the sun sets at 5 o'clock, light started its journey from the sun at 5.00 – 8.17 = 4:51:43 o'clock.

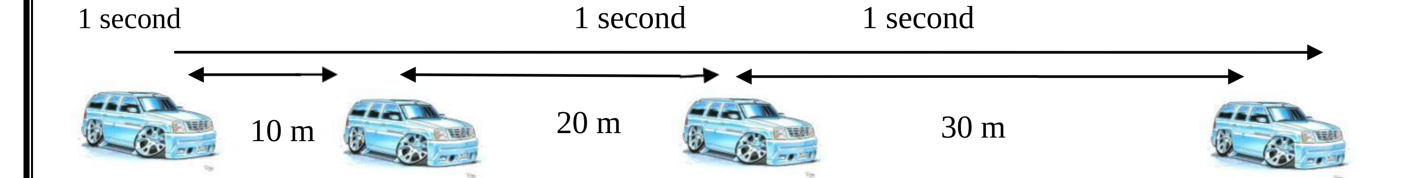
Light is the thing that move at constant speed in the space.

Non-Uniform Speed = Irregular Speed

1. The speed is non-uniform when a moving object covers equal distances in variable intervals of time.



2. When a moving object covers variable distances in equal intervals of time, its speed is non-uniform.



Average Speed

The total time covered by moving object divided by total time:

- Consider a car trip from your home to a place 100 km away along a straight road. You took an hour to reach your destiny. You probably decreased your speed at certain moments then stopped in front of a red light then increased your speed again. Your speed through the trip is non-uniform.
- Your average speed through the whole trip = distance covered ÷ time taken
- Therefore the average speed of this trip = 100km/1hour = 100km/h

The average speed equals the constant speed needed to cover the given distance in a given time interval.

- This value is average. You probably traveled slower than 100km/h at other times.
- Average speed = $\frac{\text{Total distance}}{\text{Total time}} = \frac{d_1 + d_2 + d_3 + \ldots}{t_1 + t_2 + t_3 + \ldots}$

Notes:

- The average speed is equal to the constant speed needed to cover the given distance in a given time interval.
- For a car moving with regular speed, its regular speed = the average speed.
- When the car is moving with irregular speed, its average speed isn't equal to the regular speed because its motion is irregular.

Relative Speed

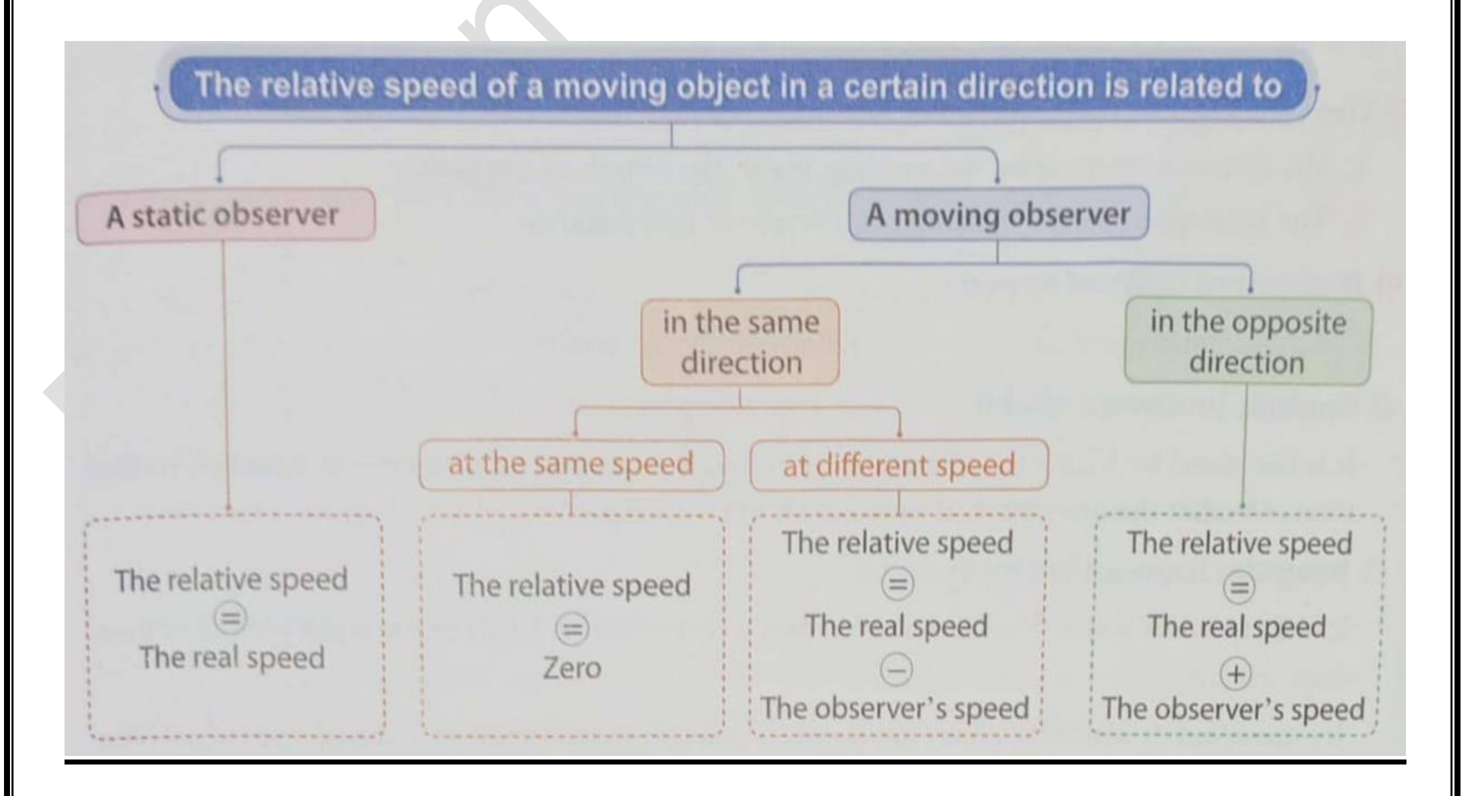
- The diagrams below show two cars moving along the same straight road .The speed of car B is 80 km/h & the speed of car A is 10km/h .
- For an observer who is in car B , the speed of car A is only 10 km/h



- For an observer standing on the pavement, the speed of car A = 80km/h while the speed of car B = 90km/h.

- Measuring the speed depends on the position of the observer who is determining the magnitude (value) of the speed.
- Relative speed depends on the position of the observer.

Relative speed is the speed of a moving object relative to an observer.



Work sheet

Lesson one

I) Complete the following statements :

1. The …………….. is defined as the speed of moving object relative to the observer .
2. The total distance that a moving object covers divided by the total time taken to cover this distance is known as ………………..
3. The uniform speed of a car is 90 km/ hour so , its speed equals ………… m/s .
4. When the average speed of an object equals the uniform speed in this case the motion represents …………… motion .
5. The relative speed of moving object depends on …………………..

II) Write the scientific term :

1. The distance that a moving object covers within a unit time . [……….……….]
2. The speed in which the object moves to cover equal distances at equal periods of time . [……….……..]
3. The speed of moving object relative to the observer . [……….…….…..]
4. The change in the position of a body by time relative to the position of another body . [……………..…..]
5. The simplest type of motion . [……………...]

III) Put (√) or (×) then correct what is wrong :

1. When a moving object covers equal distances at equal periods of time so it moves with uniform acceleration (   )
2. A car moves with regular speed covers 500 meters in 20 sec. its speed is 200 m/s(   )
3. Average speed is the speed of a moving object relative to the observer (   )
4. Measuring the relative speed for a moving car depends on the presence of speedometer which determines the speed value. (   )
5. The relative speed of two moving bodies in the same direction equals the sum of their speed . (   )

IV) Give reasons for :

1. The moving car seems stable to an observer moves with the same speed and direction .

……………………………………………………………………………………

2. The uniform speed of a car can't be obtained practically .

……………………………………………………………………………………

3. The motion of the trains can be considered as a motion in one direction .

……………………………………………………………………………………

V) Define each of the following :

(1) Speed

……………………………………………………………………………………

(2) Irregular speed

……………………………………………………………………………………

VI) Problem

A runner covered a distance of100 meters to the north in 30 seconds , then 50 meters to the east in 10 seconds , then 100 meters to the south in 15 seconds , then he came back again to the starting point in 5 seconds . calculate .

1. The total distance covered by the runner .

……………………………………………………………………………..

2. The average speed of the runner .

……………………………………………………………………………………

Lesson2:
Graphic representation of motion in a straight line

Physicists use graphs to describe physical quantities.

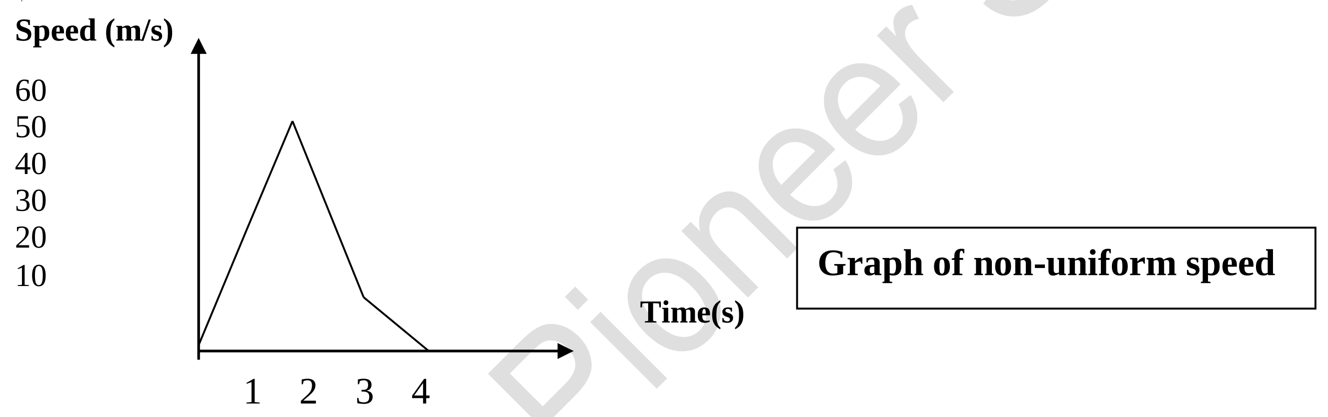
A toy car starts its motion from rest where the speed = 0 In the 1^{st} s, the speed=30 m/s.

In the 2^{nd} s, the speed=60m/s.

In the 3^{rd} s, the speed falls to 20m/s. After 4 sec. , the car stops moving.

❖The motion of the car could be represented by the following graph:

1. <u>Representation of non-uniform speed</u>



Graph of non-uniform speed

What do you conclude from the graph?

- The speed of the toy car increases during the first 2 seconds**.**
- The speed of the toy car decrease during the last 2seconds.

<u>**Therefore the car is moving with non-uniform speed represented by curved line.**</u>

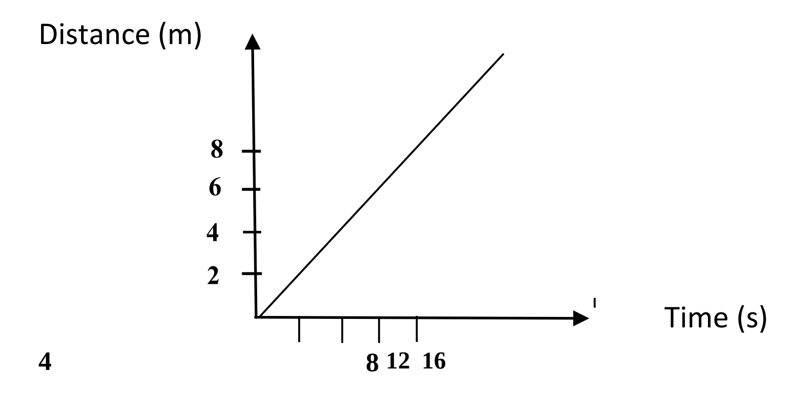
2. <u>Representing uniform speed by graphs.</u>

The following table contains some data that describes the motion of a toy car.



Time (s)	Distance(m)	speed d/t
4	2	½
8	4	½
12	6	½
16	8	½

Let’s plot the data in the table in a graph where the x axis represents time & y axis is the distance.



The graph of distance versus time for motion with uniform speed is a straight line starting with the point of origin.

Note: The origin point is also called the point of intersection of the x & y axes.

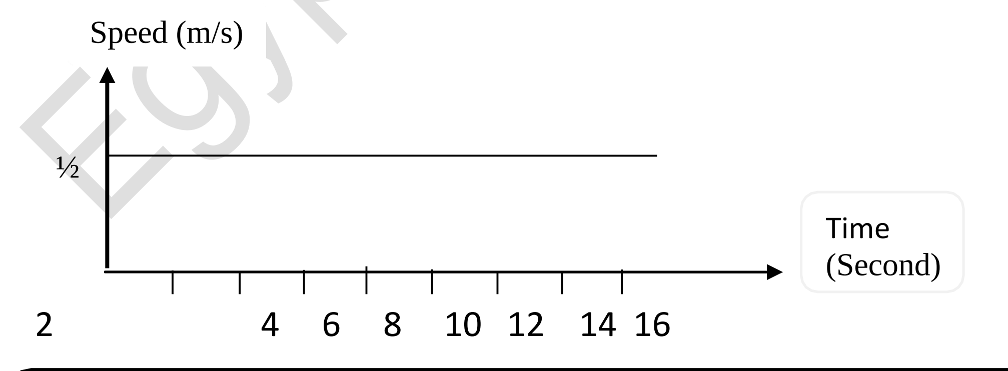
From the graph, you can conclude the following:

1. The distance is directly proportional to the time.
2. The ratio between the distance & time is constant.
3. The car is moving with uniform speed.

The following table shows the relation between the speed of the car & time.

steps	Time(s)	Speed (m/s)
1	4	½
2	8	½
3	12	½
4	16	½

The following graph represents the relation between the speed of the car & the time



The graph of speed versus time for uniform motion is a straight line parallel to the time axis.

Acceleration

A car is moving with a speed that increases with time.

speed	Time
3m/s	1 second
6m/s	2 seconds
9m/s	3 seconds
12m/s	4 seconds

The speed of the car is increasing with a regular rate, or is accelerating.

Acceleration is the rate of change of the car's speed in a certain time period.

$$A = \frac{\Delta v}{\Delta t} = \frac{\text{final speed} - \text{initial speed}}{\text{Time}}$$

Δ is the symbol of the Greek letter delta & it means change.

Definition: acceleration is the change of speed in one second.

Or.

The rate of change of speed.

- ❖ If the body is increasing its speed, the body is **accelerating**.
- ❖ If the body is decreasing its speed, then the body is **decelerating (or decreasing acceleration)**.
- ❖ The **unit** of acceleration is **m/s^2**

$$\text{Acceleration} = \frac{\Delta v}{\Delta t}$$

$$\text{Acceleration} = \frac{V_f - V_i}{\Delta t}$$

Uniform Acceleration

The following table records the speed of an object versus time intervals. The object starts its moving from rest.

Time (s)	Speed m/s	Acceleration m/s^2
0	0	-
5	10	1
10	20	1
15	30	1
20	40	1
25	50	1

1. The speed increases 10m/s every 5 seconds therefore you can calculate the increase in the speed every 1 s as follows: $v_f - v_i / \Delta t$
2. Note: v_f is the final velocity, v_i is the same velocity at the beginning of motion & since the object was at rest, then $v_i = 0$
3. The acceleration is (uniform) constant because the speed changes by equal amounts in equal time intervals.

Uniform acceleration is the change in the speed value by equal values in equal time intervals.

Note: Uniform deceleration occurs when the velocity decreases by equal values in equal time intervals.

An example:

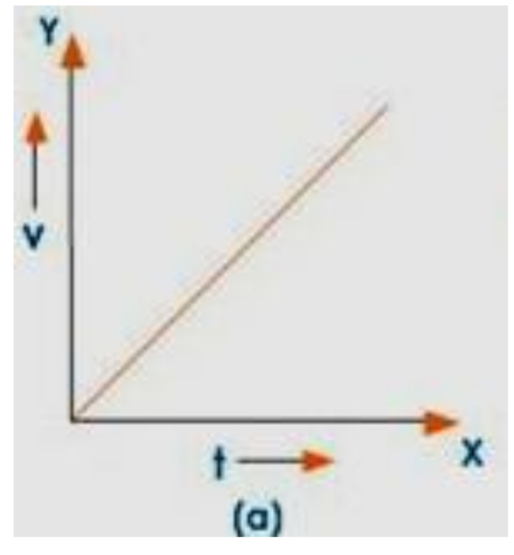
A bus is moving in a straight line with a speed 6 m/s. Its speed increases to 12m/s during a period of 3 seconds, what's the acceleration of the bus?

Solution: Acceleration = $\frac{V_f - V_i}{\Delta t}$

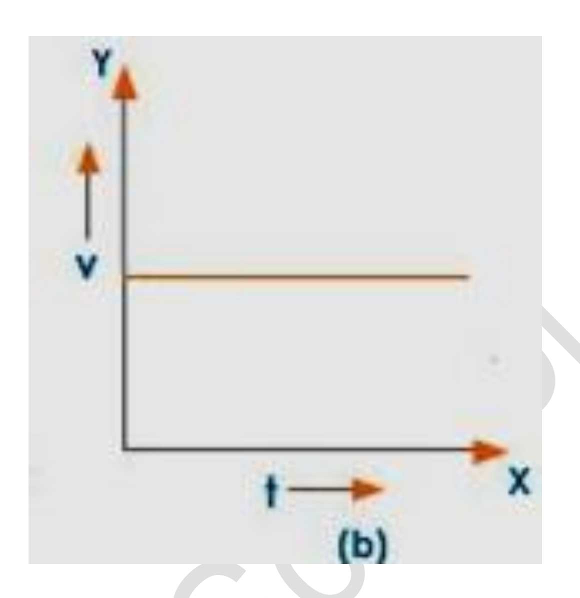
A = (12- 6) ÷ 3

A = 2 m/s^2

Graphs of acceleration



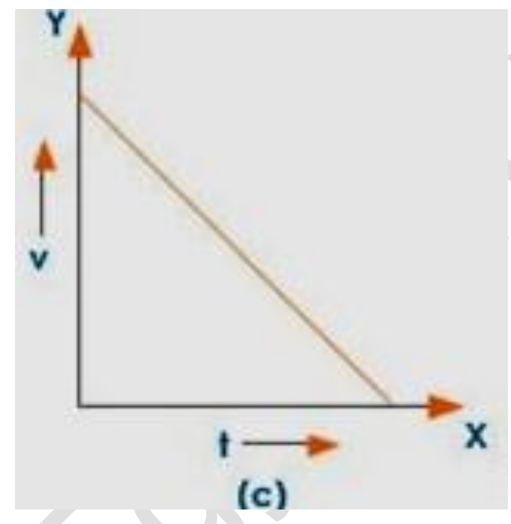
(a)



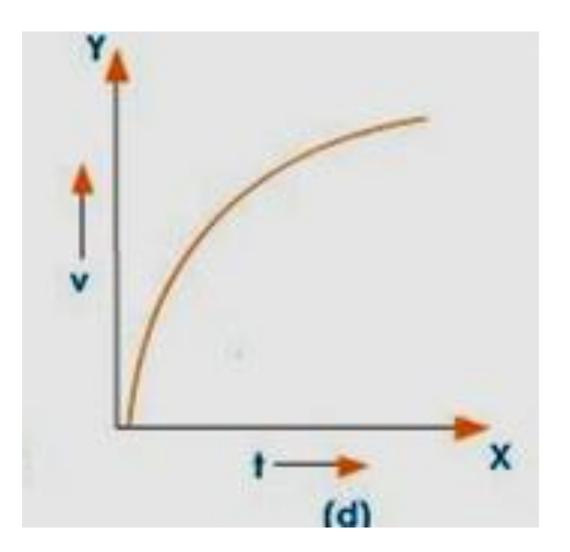
(b)

a) The object is moving with uniform acceleration (since the graph is a straight line. Changes in velocity in equal intervals of time is constant.

Enriching information



(c)



(d)

c) The object is moving with negative acceleration or deceleration (since the velocity decreases and finally becomes zero)

Work sheet
Lesson Two

I) Complete :

1. The value of change of an object's speed in one second is ……………….
2. When an object moves with decelerating motion this means that its ………… speed is greater than its ……………. Speed .
3. For a car moves with regular speed , the ratio d / t is ………………
4. The ratio between the final speed and initial speed for an object moves with accelerating motion is …………….. one .

II) Write the scientific term :

1. The graph for a regular motion at uniform speed which is represented by a straight line parallel to the (×) axis . [………..…………]
2. The change of the object's speed by equal values through equal period of time . […………………….]
3. The graph for a regular motion at uniform speed which is represented by a straight line passes through – the origin point . [……………………]

III) What's the difference between :

1. Speed – acceleration (Definition – measuring unit)

…………………………………………………………………………………………

…………………………………………………………………………………………

2. The graphical relation (distance – time) and the graphical relation (speed – time) for regular motion in a straight line at constant speed .

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IV) Problem :

- A racing car starts moving from the rest . Then its speed increased to 900 m/s through 5 second .

Calculate the acceleration of the moving car .

…………………………………………………………………………………………..

…………………………………………………………………………………………..

- A car moves at speed 100 km / h if the driver reduces its speed by a rate of -2km / h2 calculate the car's speed after half hour .

…………………………………………………………………………………………..

…………………………………………………………………………………………..

Lesson 3: Scalar & vector physical quantities

- **Physical quantity.**

Any quantity that can be measured and has measuring unit:

- **Types of physical quantities.**

	Scalar physical quantities	Vector physical quantities
Definition	It has a magnitude only.	It has a magnitude & direction.
Examples	mass (kg) length & distance (m) time(s) speed (m/s) density g/cm^3	force (Newton) Acceleration & gravitational acceleration(m/s^2) displacement (m) velocity (m/s)

Distance & displacement

- Remember that motion is the change of the position of an object over time.

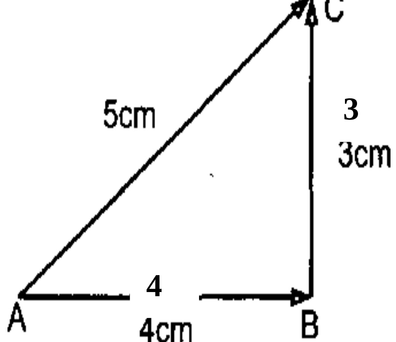
- Consider a situation, in which a person starts moving from point A first and moves 4m towards B along the line AB as in the figure.

- Then at B, he starts moving along BC (at right angles to AB) and moves a distance 3 m. Thus he has travelled a distance of 4 + 3 = 7 m to reach at point C, starting from point A.

- To know the shortest distance from A to C Join AC. The displacement AC can be obtained using Pythagoras theorem,

$AC^2 = AB^2 + BC^2 = (4)^2 + (3)^2 = 16 + 9 = 25$ AC = 5 m

- AC is the displacement of the person from A to C.



- Thus when a body moves from one point to another, the distance travelled refers to the actual length of the path whereas the displacement represents the straight-line path between initial and final position. Distance is a scalar quantity, whereas, displacement is a vector quantity.

- While mentioning displacement of a body, we have to specify the direction along which distance is to be measured.

- Both distance and displacement involve measurement of length. They are

measured in unit of length. The distance and displacement are equal only if motion is along a straight path. The magnitude of displacement is less than or equal to the actual path covered by the body.

	Displacement	**Distance**
Definition	The length of the shortest straight line between 2 positions	It’s the actual (real) length of the path that moving object covered from start point to end point.
Scalar or vector	Vector which has a magnitude & direction which describes the motion from the primary position towards the final position	Scalar quantity which has a magnitude only.

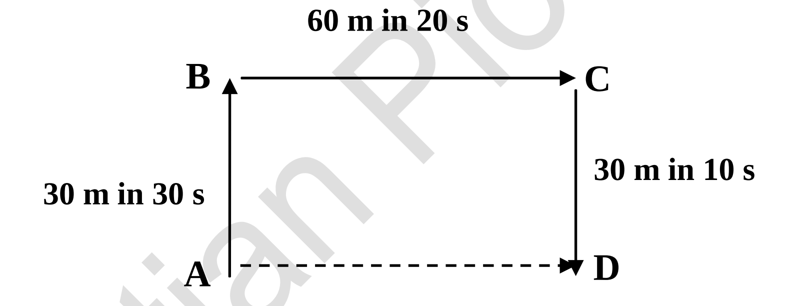
Velocity & speed:

Velocity describes motion with both a direction & a numerical value (magnitude) however speed has only magnitude but no direction.

	Speed	Velocity
Definition	Distance covered in one unit of time	Displacement travelled in one unit of time
Scalar or vector quantity	Scalar with a magnitude only	Vector with both magnitude & direction
Units	m/s or Km/h	
An example	A car moves with speed 50 km/h	A car moves with velocity 50 km/h east
Mathematical relationship	Average speed = $\frac{\text{Total distance}}{\text{Total time}}$	Average Velocity = $\frac{\text{Displacement}}{\text{Total time}}$

An example

An object starts moving from point A towards point B then C then D.



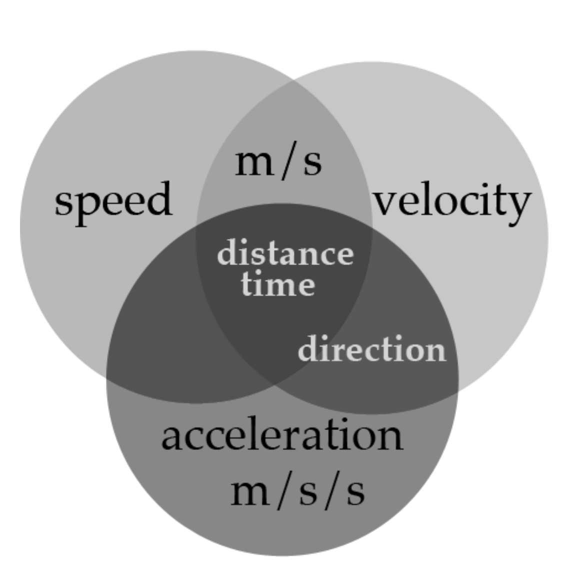
The average speed of this object = total distance / total time

$$\bar{V} = \frac{30 + 60 + 30}{30 + 20 + 10}$$

= 120 / 60 = 2 m/s

The average velocity = $\frac{\text{Displacement}}{\text{Total Time}}$

$= \frac{60}{(30 + 20 + 10)} = 1$ m/s



Enriching information:

How Wind Affects the Speed of an Airplane:

❖ The speed of an airplane is directly impacted by wind speed and direction. Before each flight the pilot gets forecasted wind speed and direction to determine the estimated ground speed of the aircraft and calculate the amount of fuel needed for the trip.

❖ Ground speed is how fast the airplane is traveling over the ground.

❖ Flying directly into the wind will cause the ground speed to be slower because of air resistance.

❖ Flying with a wind from behind will cause the ground speed to be faster.

❖ Therefore the first plane flying will consume more fuel in comparison with the second plane because of the air resistance.

Work sheet
Lesson three

I) Complete the following :

1. The …………… is a vector quantity while ………….. is a scalar quantity .
2. ……………… is the covered distance in a constant direction and is a vector quantity .
3. The vector quantity that identifies it a accurately and is necessary to identify its
…………………. as well as ……………….
4. Average velocity = $\frac{\text{.................}}{\text{.................}}$

II) What's the difference between :

- Distance and displacement (Definition only) .

……………………………………………………………………………………

……………………………………………………………………………………

- Scalar quantity and vector quantity (Definition and Examples) .

……………………………………………………………………………………

……………………………………………………………………………………

III) What is meant by :

1. The displacement of on object is 60 meters in east direction .

……………………………………………………………………………………

2. The average velocity of a moving car is 80 km / h

……………………………………………………………………………………

IV) When dose the following cases happen :

1. The displacement covered by a moving body equals zero .

……………………………………………………………………………………

2. The distance and displacement of a moving object are equal .

V) Problem :

1. A tennis ball falls from a height of 30 m . then it rebounds from the ground to upward a distance of 6 m . find the distance covered by the ball and the displacement .

……………………………………………………………………………………

……………………………………………………………………………………

……………………………………………………………………………………

2. If a body starts its motion from point (a) covered 20 meters northward till point (b)within 20 seconds, then 50 meters eastward till point (c) within 10 seconds then 20 meters southward till point (d) within 5 seconds calculate the average velocity .

……………………………………………………………………………………

……………………………………………………………………………………

3. A body moves in a circular path , starting from the point A to B to C to D and returns back to the start point (A) if the circumference of the path is 200 meters and the body covered the distance (ABC) within 10 seconds . then it covered the distance (CDA) within 20 seconds calculate :

1) The total distance the body moved .

……………………………………………………………………………………

2) The average speed of the body .

……………………………………………………………………………………

3) The displacement .

……………………………………………………………………………………

VI) Give reasons for :

1. Velocity and acceleration are vector quantities . while distance and length are scalar quantities .

……………………………………………………………………………………..
……………………………………………………………………………………..

2. Pilots take in consideration the velocity of the wind .

……………………………………………………………………………………….
……………………………………………………………………………………….

VII) Write the scientific term :

1. The length of shortest straight line between primary position and final position .
[………………………]
2. The rate of change of displacement . [………………………]
3. The vector quantity which is measured . in m/s2 . […..…………….……]

Unit 2: Light energy
Lesson 1: Mirrors

Light:

- ❖ Light is a kind of energy which causes the sensation of vision.
- ❖ Sources of light are the sun, the lamps.
- ❖ **Some of the properties of light**

Light travels in straight lines.

When light falls on a reflecting surface such as a mirror, it reflects back. Light refracts when it passes from one transparent medium to another.

- ❖ Mirrors have many uses in daily life.
- ❖ **A mirror is a shiny smooth surface that bounces off (reflects) light.**
- ❖ The surface of still water in a pond acts as a mirror because an image of objects is formed on its surface.

Mirrors have 2 kinds:

Plane (flat) mirrors (they have flat surfaces)
Their uses:
- ❖ Personal grooming.
- ❖ Decorating a building.

Spherical mirrors (their surfaces are curved)
Their uses:
- ❖ Car's side view mirrors.
- ❖ Car's rear view mirror shows the view behind the driver.
- ❖ In a barber shop & beauty salons to enlarge the face of the customer.
- ❖ In light houses at marine ports.
- ❖ In airports.







Car's rear view mirror
A Mirror focuses the light of the lamp

Light reflection:

Phenomenon of the light bouncing off (returning back) in the same medium, when it strikes a reflecting surface.

Activity 1:

Purpose: To conclude the laws of light reflection using a plane mirror.

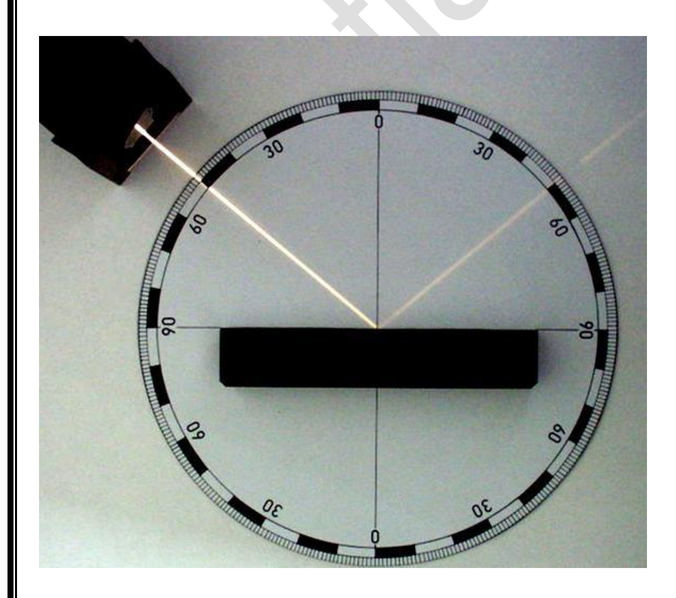
Materials:

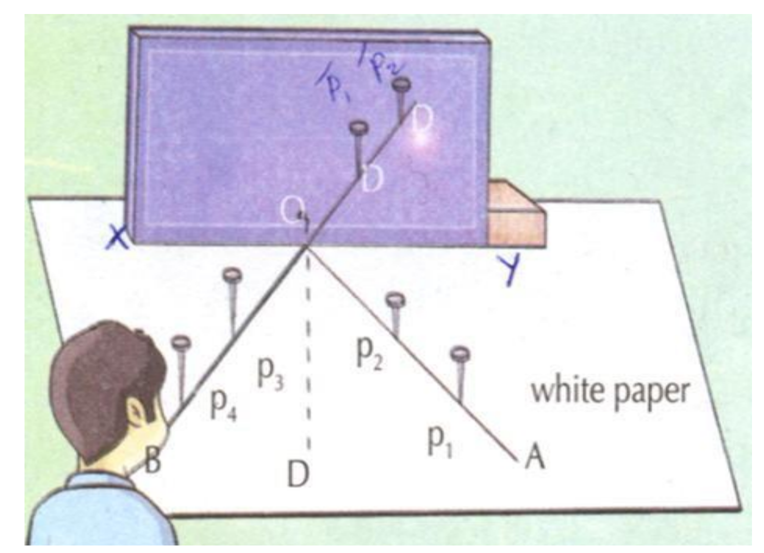
A plane mirror, a white sheet of paper, some pins, a protractor, a pencil & a ruler.

Steps:

1. Draw a straight line (xy) on a white piece of paper. Place the mirror perpendicular to the piece of paper on line (xy)
2. Draw a line OD perpendicular to the line xy. OD is the normal to the mirror.
3. Draw line AO which represents the incident light ray.
4. Place 2 pins on line AO.
5. Look at the other side of the mirror & observe the images of the 2 pins.
6. Draw a straight line continuous with the image of the pins & meets the mirror at point O.
7. Measure the angle between the reflected ray & the normal with the mirror. This angle is the angle of reflection.
8. Change the angle of incidence by changing the positions of the pins & measure the angle of incidence & the angle of reflection each time & compare their values.

Conclusion: Laws of light reflection:
1st law : the angle of incidence = the angle of reflection.
2nd law: The incident light ray, the reflected ray and the normal to the reflecting surface lie in the same plane.





Concepts of light reflection:

1. **Definition of light reflection**: when an incident light ray falls on a reflecting surface, it bounces back in the same medium.
2. **The incident ray** is the light ray that falls on a reflecting surface such as a mirror.
3. When light falls on a reflected surface (such as a mirror), it's reflected in the same medium.
4. **The reflected ray** is the light ray that bounces back from the reflecting surface.
5. **The angle of incidence** is the angle between the incident ray & the normal.
6. **The angle of reflection** is the angle between the reflected ray & the normal.

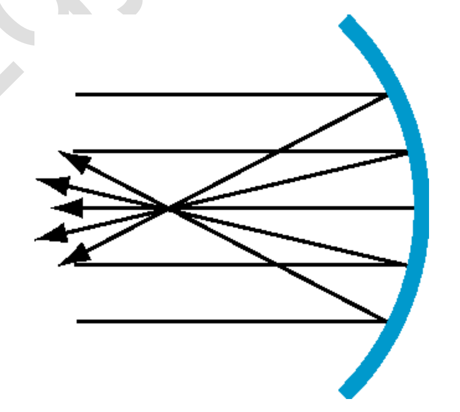
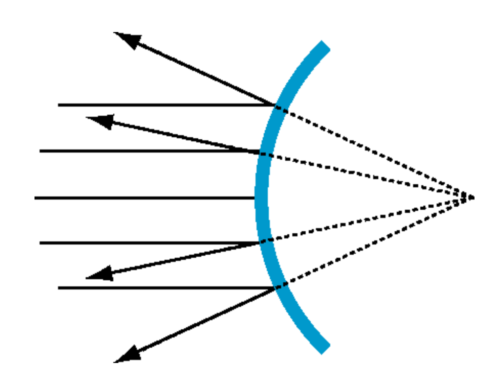
The properties of an image formed by a plane mirror:

1. Upright
2. Laterally inverted
3. Equal in size to the object.
4. Virtual (can't be received on a screen)
5. The distance between the object & the mirror = the distance between the image & the mirror.

Spherical mirrors

The reflecting surface of a spherical mirror is a part of a hollow sphere.

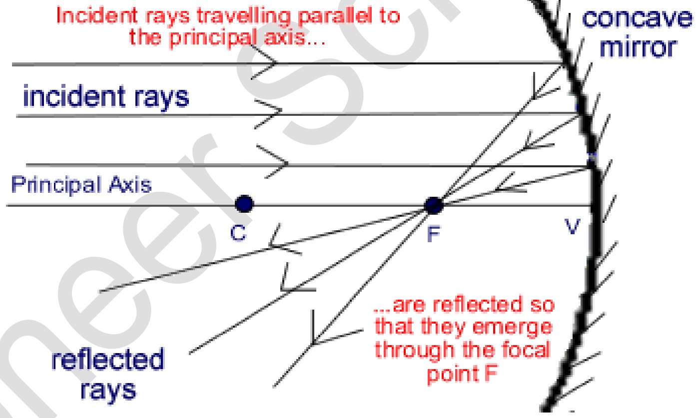
The concave (converging) mirror	The convex (diverging) mirror
It converges (collects) light rays.	It diverges (scatters) light rays.
The reflecting surface is the inner surface of the	The reflecting surface is the outer surface of the sphere.

Definitions:

1. **Centre of curvature: (C)** is the center of the sphere that the mirror is part of. The center of the **concave mirror** is **in front of the mirror** while the center of the **convex mirror** is **behind** the convex mirror.
2. **Radius of curvature:** is the radius of the sphere that the mirror is part of.
3. **The pole (P)** is the point in the middle of the reflecting surface of the mirror.
4. **The principle axis (CP)** is the straight line that passes through the center of curvature (C) and the pole (P).
5. **The secondary axis** is the line that passes through the center of curvature (C) and any point on the surface of the mirror except the pole (P).
6. The **focus** is the point of collection of the reflected rays (when these rays fall parallel to the principle axis).

The **rays coming from a distant source** like the sun fall on the mirror **parallel** as in the figure



An activity to determine the focal length of the concave mirror

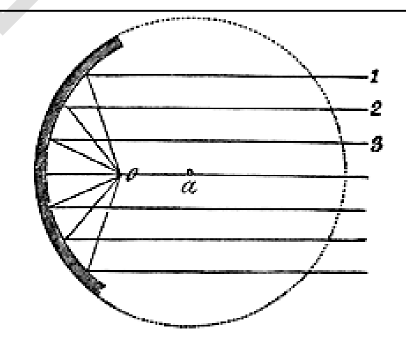
Steps:

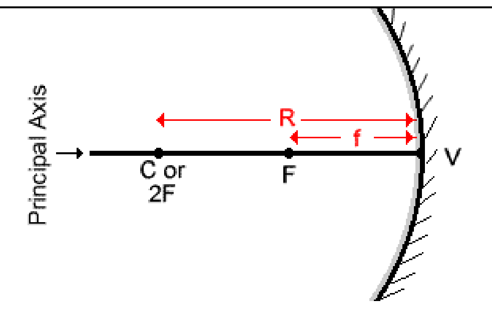
1. Place a mirror facing the sun or a distant object.
2. Move the screen in front of the reflecting surface of the mirror to obtain the sharpest & brightest image (a lit point).
3. Measure the distance between the lit point & the pole of the mirror, this distance is the **focal length (f)** of the concave mirror.

Conclusion:

- ❖ The reflected rays collect in a point & is received on a screen. This point is the focus.
- ❖ The **focal length** is the distance between the focus & the pole.

  the focal length = ½ the radius of the curvature

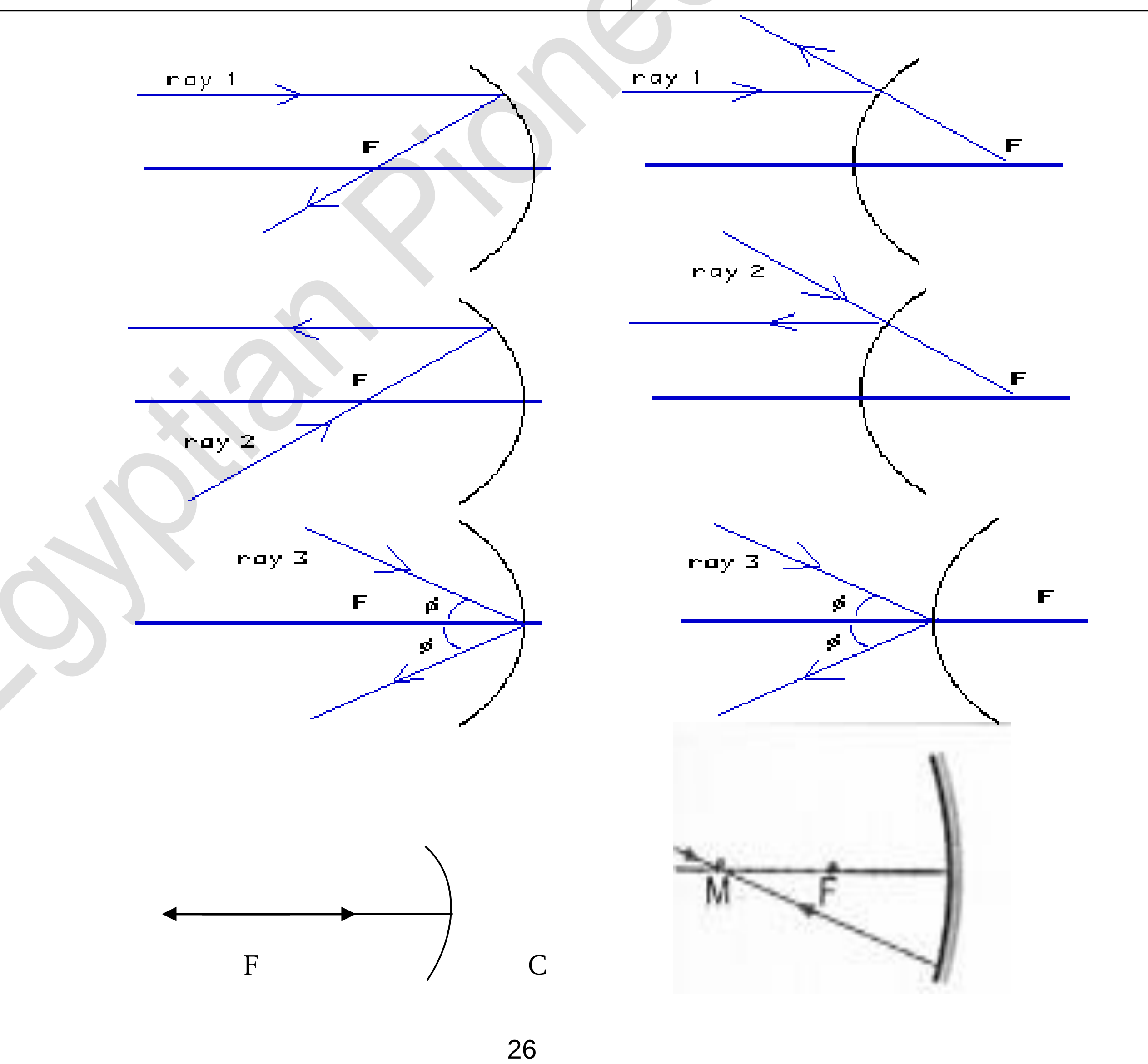




The Principle axis of a spherical mirror	**The secondary axis of a spherical mirror**
1. It's the line that passes through the center of curvature (C) and the pole (P).	1. It's the line that passes through the center of curvature (C) and any point on the surface of the mirror except the pole (P).
2. There's only one principle axis for a spherical mirror	2. There are many (uncountable) number of secondary axes.

The path of light reflected from a spherical mirror

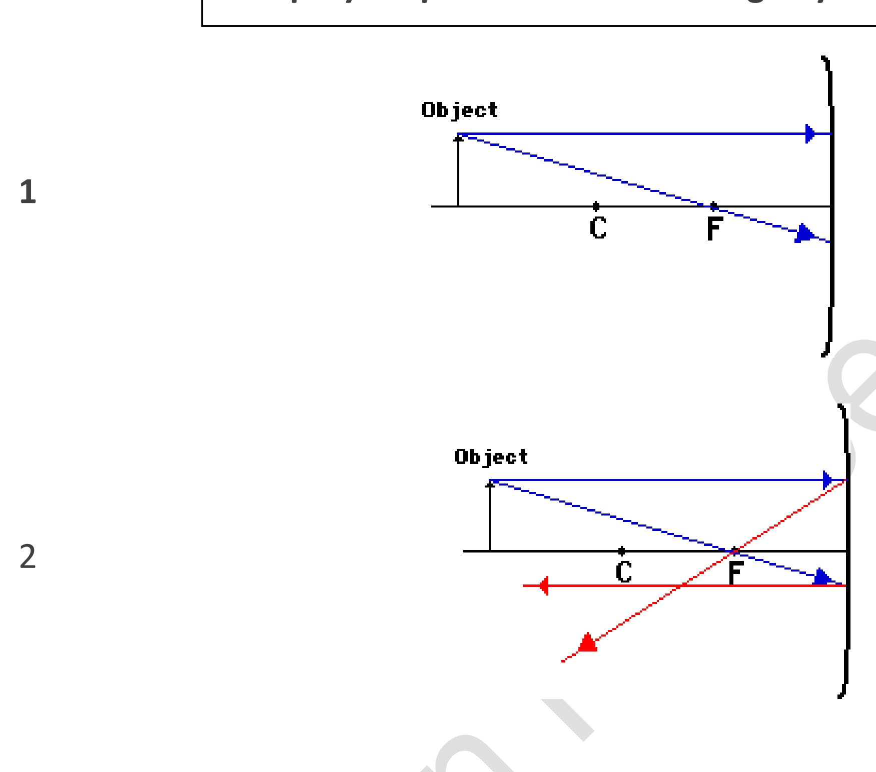
	The incident ray	the reflected ray
1.	The ray that falls parallel to the principle	Passes through the focus.
2.	The ray passing through the focus	Parallel to the principle axis.
3.	The ray falling on any point on the surface of the mirror surface	It reflects so that the angle of incidence = the angle of
4.	The ray passing through the curvature	On itself.



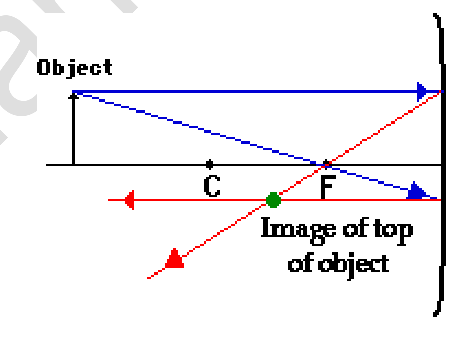
ray 4

The real image	The virtual image
1. It's formed of the intersection of the reflected light rays. 2. It can be received on a screen. 3. It's always inverted.	1. It's formed of the intersection of the extension of the reflected rays. 2. It can't be received on a screen. 3. It's always upright (erect).

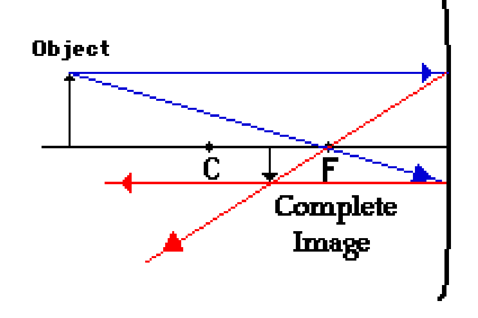
Step-by-Step Method for Drawing Ray Diagrams



3



4



Images formed by a concave mirror

Position of the object	Position of the image	The properties of the image	Drawings
1. At a distance more than the radius of curvature (i.e. a distance larger than double the focal length)	Between the focus & the center	• Real • Inverted • Smaller than the object	
2. At the center of curvature (i.e. at a distance = double the focal length)	At the center of curvature	• Real • Inverted • Equal in size to the object	
3. Between Center C & the focus F (i.e. at a distance < double the focal length)	At a distance greater than the radius	• Real • Inverted • Larger than the object	
4. Between the focus & the pole (i.e. at a distance less than the focal length)	Behind the mirror	• Virtual • Upright • Magnified	
5. An object very far away	At the focus	• Very small	

The uses of concave mirrors

Solar ovens which collect & concentrate sun rays at the focus & generate heat to cook food without need for burning fuel & polluting the environment, hence solar energy is a clean source of energy.

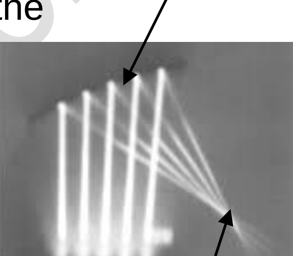
An activity

Purpose: to determine the radius of the concave mirror & deduce the focal length.

Steps:

1. Place the mirror on a holder in front of the light source (description: a box which contains a bulb & light shines through a tiny opening)
2. Move the mirror at different distances until you get an image equal in size to the original spot of light.
3. Measure the distance between the mirror & the opening of the box.

Concave mirror



Focus

Conclusion

The **focal length** is the distance between the focus & the pole.

the focal length = ½ the radius of the curvature

Formation of images by convex mirrors

The convex mirror diverges light therefore the image they form have different properties:

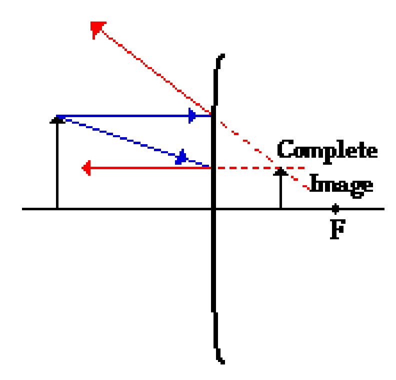
- ❖ The image is smaller than the object.
- ❖ Upright (erect)
- ❖ Virtual (not received on a screen)

Uses of convex mirrors:

1. The rear view mirror in the car & side view mirrors are convex mirrors because they form erect images smaller than the cars behind the driver. The driver also looks in the mirrors before he turns right or left & when he parks the car.



The image of the car behind the driver is formed in the side view mirror



Enriching information: Image formed by the convex mirror

Work Sheet
Unit Two
Lesson one

I) Write the scientific term :

1. The rebounding of light to the same side when it strikes a reflecting surface . [………………………..…]
2. The angle between the incident light ray and the perpendicular line on the reflecting surface . [……………………….]
3. Angle of incidence = Angle of reflection . […………….………….]
4. The point of collection of parallel light rays to the principal axis of the concave mirror . [………………………..]
5. Twice the focal length of a spherical mirror . [………………..………]

II) Put (√) or (×) in front of the following statements and correct the false ones

1. The distance between the object and a plane mirror is more than the distance between the plane mirror and the image . (   )
2. When the angle between the incident ray and the plane mirror surface is 60º , so the angle of reflection is 50º . (   )
3. The formed image for a body put in front of a convex mirror is virtual . inverted and small . (   )
4. A spherical mirror of diameter equals 14 cm , its focal length is 6 cm .(   )
5. The focus is the point that is in the middle of the reflective surface of the mirror . (   )

III) Give reasons for :

1. Concave mirror is used in cooking by using solar energy .

……………………………………………………………………………………………
……………………………………………………………………………………………

2. A convex mirror is put at the left side of the driver of the car .

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……………………………………………………………………………………………

3. The incident light ray falling perpendicular on a reflecting surface reflects on itself

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……………………………………………………………………………………………

4. The word AMBULANCE is written in a converted way on the ambulance car.

……………………………………………………………………………………………
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IV) Show by drawing the path and the direction of rays in the following cases :

• An object in front of a concave mirror at a distance less than its focal length (Determine the properties of the formed) image .

……………………………………………………………………………………………
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• The image that is formed by the convex mirror .

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• An object in front of a concave mirror at a distance of 7 cm . Knowing that its focal length is 5 cm .

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V) An object is put at a distance 20 cm from a mirror the image is formed on a screen and has a length equal to the object .

(1) What is the type of the mirror .

………………………………………………………………………………………………

(2) Calculate the focal length of the mirror .

………………………………………………………………………………………………

(3) Draw the path rays that shows the formation of this image .

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Lesson 2: Lenses

❖ **A lens is** a transparent medium (glass or plastic) which has spherical surfaces (faces) which refract light.

❖ **The uses of lenses:**

a. medical eyeglasses (needed to see things clearly during reading or doing daily activities such as walking)

b. magnifying lenses are used to fix watches

c. Leaders watch battle field using binoculars (magnifying glasses).

d. In telescope that study planets.

e. In microscopes.



Image of a plant seen through a convex lens

❖ Types of lenses

Concave lens	Convex lens
1. The center is thin & it thickens towards the tips. **2. Diverges (scatters) light rays.** **3. It has a virtual focus .**	**1. The center is thick & it thins towards the tips.** **2. Converges (collects) light rays.** **3. It has a real focus**

Special concepts related to the lenses:

- ❖ The **center of curvature** of the lens (C) is the center of the sphere which the lens is part of.
- ❖ The **optical center** is the midpoint between the two faces of the lens on the principle axis.
- ❖ **The principle axis of the lens** is the line joining the two centers of curvature of the two spherical faces of the lens.
- ❖ The **focus** of the lens is the point of intersection of the parallel light rays after their refraction.
- ❖ The **radius** of the lens is the radius or (half the diameter) of the sphere where the lens is part of.
- ❖ The focal length is the distance between the focus & the optical center of the lens.

The focus & focal length

Sun rays that pass through the lens, collect at one point called **focus** of the lens.

An activity:

Purpose: To determine the focal length of the convex lens.

Materials: convex lens, screen, lens holder, distant source of light (the sun).

Steps:

1. Place the lens on a holder facing the sun.
2. Place a horizontal screen on the other side of the lens. Move the screen until you get a sharp spot light which is the image of the sun. This point is the focus of the lens.
3. Measure the distance between this point & the lens which is the focal length.

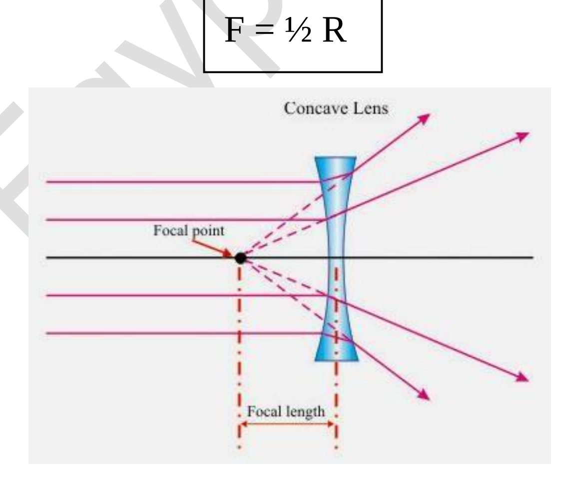
Conclusion:

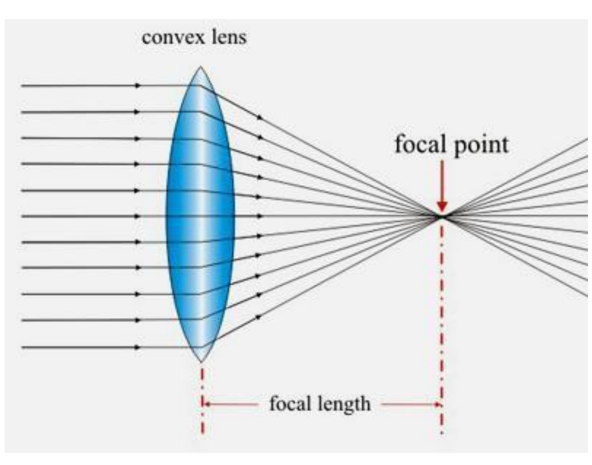
1- Convex lens is a converging lens as it collects the refracted rays.

2- Point of collection of parallel rays refracted by the lens is the focus.

3- Distance between the focus of the lens & its optical center is the focal length of the lens F.

$$F = \frac{1}{2} R$$





Comparison between the principle axis & the secondary axis

The principle axis	The secondary axis
• It's the line joining the two centers of curvature of the two spherical faces of the lens. • There's only 1 principle axis. C1 C2	• It's any line passing through the optical center of the lens except the principle axis. • There're many secondary axes.

The path of light passing through a convex lens

The incident ray	The refracted ray	drawings
1. The ray that falls parallel to the principle axis	1. Passes through the focus	C F F C
2. The ray passing through the focus	2. Parallel to the principle axis	C F F
3. The ray passing through the optical center	3. Passes without refraction	C F F C

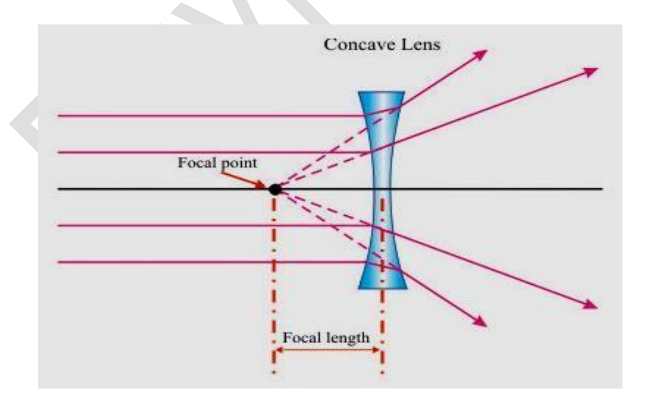
The images formed by the convex lens:
when an object is placed in front of the convex lens , the position & characteristics of the image formed can be determined by drawing 2 light rays & their refraction through the lens.

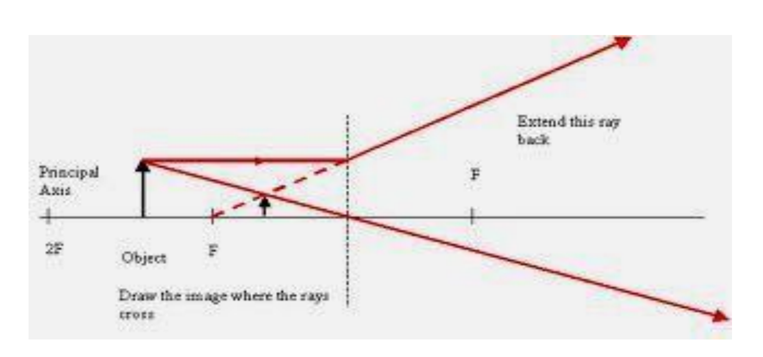
Position of the object	Position of the image	The properties of the image	Drawings
1. At a very large distance	At the focus	• Real • Very small	F
2. At a distance more than the radius of curvature (i.e. more than double the focal length)	Between the focus & double the focal length	• Real • Inverted • Smaller than the object	C F F C
3. At the center of curvature (double the focal length)	At the center of curvature (double the focal length)	• Real • Inverted • Equal in size to the object	C F F C

4. Between Center C & the focus F (i.e. between the focus & double the focal length)	At a distance greater than the radius (i.e. double the focal length)	• Real • Inverted • Larger than the object	C F F C
5. At the focus	No image is formed		F F
6. At a distance less than the focal length	At the same side of the object (in front of the lens)	• Virtual • Upright • Enlarged = (magnified)	F F

A concave lens

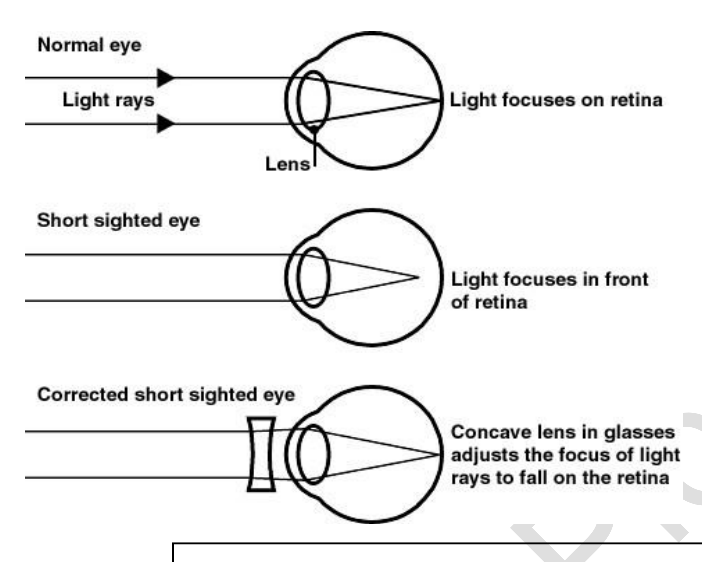
- ➢ The focal length of the thick lens is smaller than the thin lens.
- ➢ Concave lens is a diverging lens because it diverges (scatters) rays passing through it.
- ➢ The extensions of the scattered light rays collect in a point which is considered as the **focus** of the concave lens in front of the lens.
- ➢ The focus of the concave lens is virtual because it can't be received on a screen.
- ➢ The image formed by a concave lens is always **<u>virtual, small & erect</u>**.

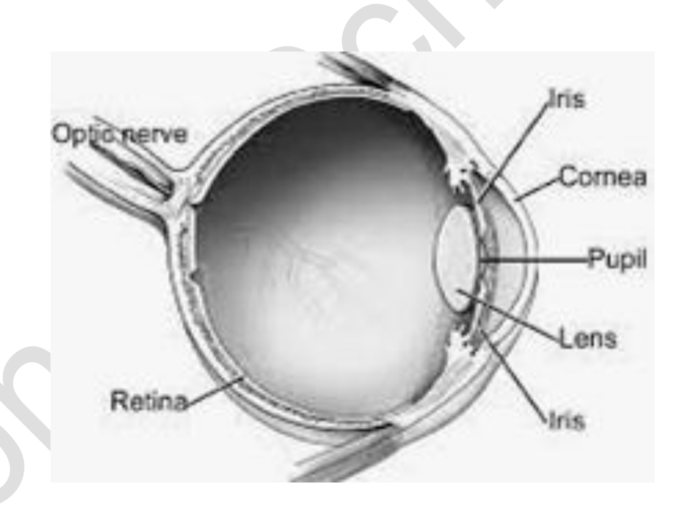




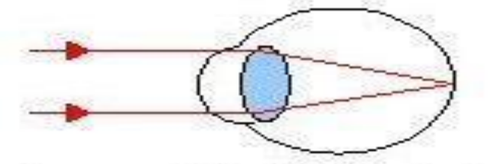
Comparison between the real focus & the virtual focus

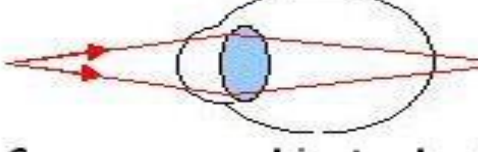
The real focus	The virtual focus
It's a principle focus formed from the intersection of refracted light rays.	It's a principle focus formed from the extension of refracted rays.
It's the focus of the convex lens	

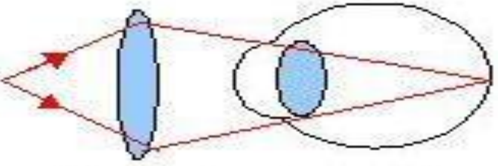




Enriching information:
20/ 20 Eyesight is perfect . It means that the person can see a size twenty font letter from a twenty-foot distance (6 meters). These measurements are used in defining a person's vision.
To get a clear image of the object ,the least distance between the object & the eye should be 25 cm.







Vision Defects

Short sight	Long sight
The Person can see near objects clearly and can't see far objects	The person can see far objects clearly and can't see near objects.
The image of far objects is formed in front of the retina.	The image of near objects is formed behind the retina.
What causes it? The diameter of the eyeball is too long.	What causes it? The diameter of the eyeball is too short.
The curvature of convex lens is It is treated (corrected) by using Concave lens (diverging lens).	The curvature of convex lens is weak. It is treated (corrected) by using convex lens (converging lens).

Contact lenses:

❖ They are used instead of glasses. These thin plastic lenses are cover the cornea.

❖ They are cleaned by keeping them in an antimicrobial fluid.

Enriching Activities Land surveying

❖ Land surveying accurately measures the three-dimensional position of land and distances to establish land maps and boundaries.

❖ Surveyors use a mirror & laser beam to measure distances & heights.

❖ Time needed for a light beam to hit a point & bounce back is calculated & used to determine distances.

The Archimedes Heat Ray

❖ Archimedes may have used concave mirrors as a reflector to burn ships attacking Sicily (in212 BC), Archimedes destroyed enemy ships with fire.

❖ The device, called the "Archimedes heat ray", was used to focus sunlight onto approaching ships, causing them to catch fire.

Cataract

❖ A cataract is a clouding in the lens of the eye, varying in degree from slight to complete opacity and preventing the passage of light.

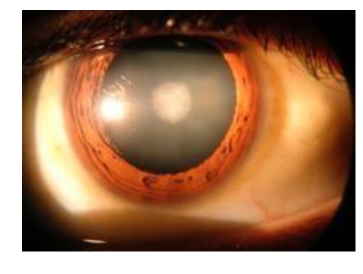
❖ **Causes:**

Cataracts develop for many reasons, including long-term exposure to ultraviolet light, side effects of drugs , effects of diseases such as diabetes, hypertension and old age.

❖ Genetic factors are a cause of cataracts and positive family history may have a role in someone getting cataracts at an earlier age.

❖ **Treatment**

It's removed by surgery, by making a cut into the capsule of the cloudy lens in order to surgically remove the lens & transplant a plastic lens permanently in the eye to restore the eye sight..



Work Sheet

Lesson (2)

I) Complete the following statements :

1. A point inside the lens placed on the principal axis in the mid distance between its faces is ……………………… .
2. The radius of the convex lens = ………………. Its focal length .
3. The long sighted person needs a medical eye glasses with …………. Lenses .
4. The optical piece that forms an equal . inverted image of the body is the ……….

II) Write the scientific term :

1. The line joining between the two centers of curvature of the lens and passing through the optical center . [ ]
2. A vision defect results due to the formation of the image in front of retina . [ ]
3. The lenses that are used instead of glasses and can stick to the eye cornea . [ ]
4. A disease infects the eye lens , so it becomes dark . [ ]

III) Give reasons for :

1. The convex lens has two foci , but the concave mirror has one focus .

………………………………………………………………………………………

………………………………………………………………………………………

2. The short – sightedness is treated by using a concave lens .

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3. It's impossible to obtain a real image by using a concave lens .

………………………………………………………………………………………

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4. the convex lens is called converging lens while the concave lens is called diverging lens .

………………………………………………………………………………………

………………………………………………………………………………………

IV) What happens when :

1. A light ray is incident parallel to the principal axis of the convex lens .

……………………………………………………………………………………………

2. The eye lens is too convex .

…………………………………………………………………………………………..

3. A light ray passes through the optical center of the lens .

……………………………………………………………………………………………

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V) Define each of the following :

1. The lens .

…………………………………………………………………………………………….

2. The center of curvature of the lens face .

……………………………………………………………………………………………

3. Short sight defect .

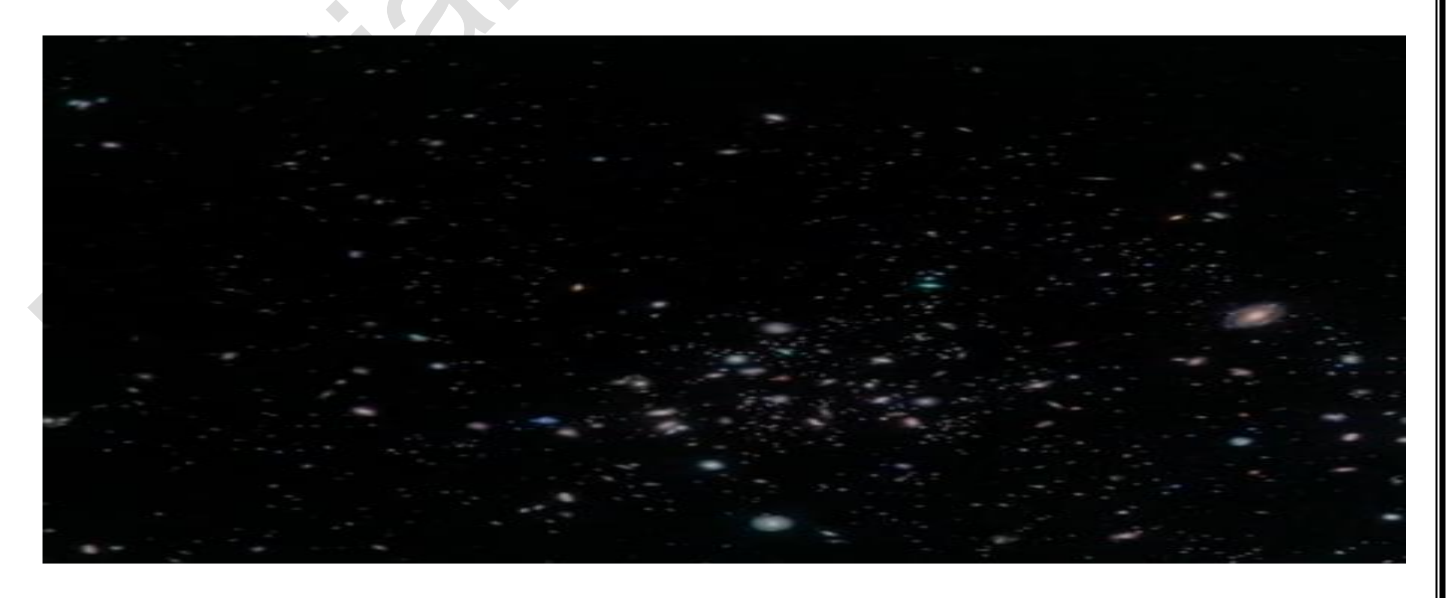
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Unit 3: the universe and the solar

The universe: It's the wide and extended space that contains all the galaxies, stars, planets, moons, living, organisms, and everything.
The universe is: very vast, the sun, earth, are tiny parts in the universe, contains about 100,000 million galaxies.
The galaxies: they're groups of stars that rotate together in cosmic space by the effect of gravity, they're the greatest units that form the universe.



Each galaxy is distinctive shape according to the harmony and order of the stars group in it.
Galaxies clusters: they're groups of galaxies that rotate together in cosmic space by the effect of gravity.



The galaxy that our solar system belongs to is the "milky way galaxy"
It has been given that cause it appears as splashing milk or spreading straw.

The milky way galaxy:

1-Considered one of the spiral galaxies.
2-Contains all stars we see at night.
3-the sun is a star of millions of stars rotates around the center of the milky way galaxy in fixed orbit .
4-the old stars gather in the center surrounded by small stars the recent one that located in the spiral arms of the galaxy.



The solar system: contains the sun and eight planets revolving around the sun. It's located in one of the spiral arms of the Milky Way on the edge of the galaxy.

The sun takes about 220 million years to complete one rotation around the center of the galaxy, the earth is one planet that rotates around the sun.

The gravity force is keeping the planets in their orbits around the sun and the moons in their orbit around the planets.

As the distance between the planets and the sun increases ,the gravity decreases and it's movement in orbit become slower.

Measuring distances between celestial bodies in the universe:

The distance between them are very large, so the distance aren't measured in kilometers, but they're measured in unit called "light year".

Light year: it's distance covered with light in one year and it equals 9.46×10^{12}km.

Expansion of the universe:

Distance between the galaxies increase as time passes and galaxies move away from each other in the cosmic space, this phenomena known as “the expansion of the universe”.
Expansion of the universe :it’s the continuous separation between galaxies in space as a result of their regular movement.



The origin of the universe:

The big bang theory: it assumes that the universe begun as a gaseous ball of high pressure, high temperature and small in volume.
Then a massive explosion occurs to this ball since 1500 million years and it’s components were scattered in space followed by continuous expansion and

changing processes till now, as a result all forms of matter, energy ,space , time was formed.

Big bang: it's a theory explains the origin of the universe from a massive explosion since 15000 million years and resulted in it's all forms of matter ,energy , time ,space ,followed by continuous expansion and changing processes.

Theories about the evolution of the solar system:



There's about 20 theories, they're still unproved and subjected to change.

The most important theories are 3 which:

1-the nebular theory **(Laplace).**
2-the crossing star theory **(chamberlain and moulton).**
3-the modern theory **(Fred hoyle).**

1-the nebular theory (Laplace):

-The scientist Pierre Simon Laplace published a research entitled "world order"
-it included his perception of evolution of the solar system.

- **his perception has been affected by 2 observations which:**

1-there's something that looks like clouds or nebula in space.
2-the space contains many cloudy rings surrounding some planets like Saturn rings.

Assumption of the nebular theory:

It's assumed that the origin of the solar system was the nebula.

The three phases of nebular theory:

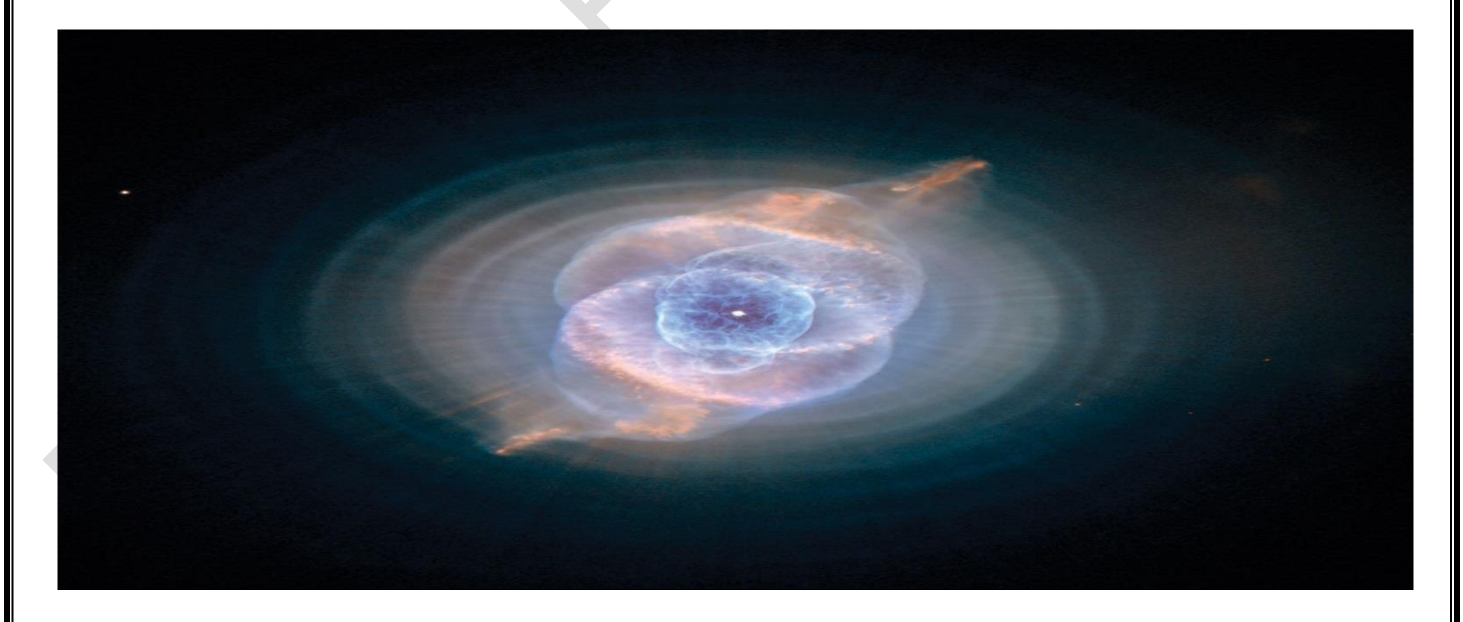
1-the contraction of the nebula (gaseous sphere): the solar system originated from a glowing gaseous sphere revolving around itself called "nebula", over the time the nebula lost its heat gradually, so it's size contracted and its revolving speed around itself increased.

2-formation of the gaseous rings: the centrifugal force arising from the rotation of nebula around its axis led to:

a-the nebula lost its spherical shape and became in a form of a flat rotating disk.
b-separation of parts of nebula in the form of gaseous rings that also rotate around the remaining flaming mass from it in the same direction.

3-formation of the solar system: the gaseous rings cooled down and frozen forming the planets of the Solar system, while the flaming mass that remained in the center formed the "sun".

Nebula: it's a glowing gaseous sphere revolving around itself ,that the solar system originated from.



The crossing star

1-another huge star approached the sun.
2-this star attracted the sun to it, leading to a great expansion in the part of the sun facing it.
3-the expanded part from the sun was exploded leading to: The sun escaped from the gravity of that star. A gaseous line was formed of great length from the sun until the last planets.
4-the gaseous line started to condense due to the attraction force, then it cooled forming the planets.

The modern theory of the world

Fred hoyle built his theory on the phenomenon known as **"stars explosion phenomenon"**

Star explosion phenomenon: glowing of a star for a short time to become one of the most shining stars in the sky ,then it's glowing disappears gradually to return as it was.

The interpretation of this phenomenon is:

1-sudden violent nuclear reaction occur within the star which led to its explosion
2-the star bombs huge amounts of gaseous materials as a result of this explosion which led to increasing its size and it's shining.
3-when the bombed gases are cooled, the shining of the star returned as it was.

Assumptions of modern theory:

1-a star was rotating near the sun.
2-the star exploded due to huge nuclear reactions.
3-the force of the explosion led to: a-the bombing of the star's nucleus away from the gravity of the sun. b-a gaseous cloud from this star remained around the sun.
4-the gaseous cloud subjected to cooling and contraction processes forming the matter of planets, then the attraction force of the sun controlled the orbits of the planets around it .

The important instruments to study the outer space:

The solar telescope: they use it as Hubble telescope to study the sun.
Importance of the solar telescope: it forms a complete picture for the sun.



Worksheet:

1-Right or wrong:

1-The solar system is located in the Milky Way . ( )

2-The universe emerged from the particles of the oxygen and nitrogen . ( )

3-The solar system contains many stars . ( )

4- galaxies rotate in the system around the center of the universe .( )

5-the universe contains various galaxies that move away from each other. ( )

3- Give reasons:

1-The continuous expansion of the space.

2-The constancy of the Earth's rotation in an orbit around the sun.

3-The day and year time are differ from one planet to another.

4-Galaxies move away from each other.

4-write the scientific term:

1-the space which contains all galaxies ,stars ,planets , moons ,living organisms and everything, it's wide and extended space that contains galaxies.
2-the greatest unit that form the universe.
3-a large gathering groups of stars found in clusters.
4-groups of stars that rotate together in the space by the effect of gravity.

5- Complete:

1-The Earth planet belongs to a galaxy called …………………….. .

2-The sun takes ………………… Years to complete one rotation around the center of the galaxy.

3-After 10,000 million years of the Big Bang, …………………… was born and then ………………… and ……………….. were created.

4-The ………………… Is the space which contain all the galaxies, stars, planets, moons and living organisms.

5-The expansion of the universe and the merging of atomic particles creating helium and hydrogen is …………………… .

Unit 4:
Reproduction and special continuity

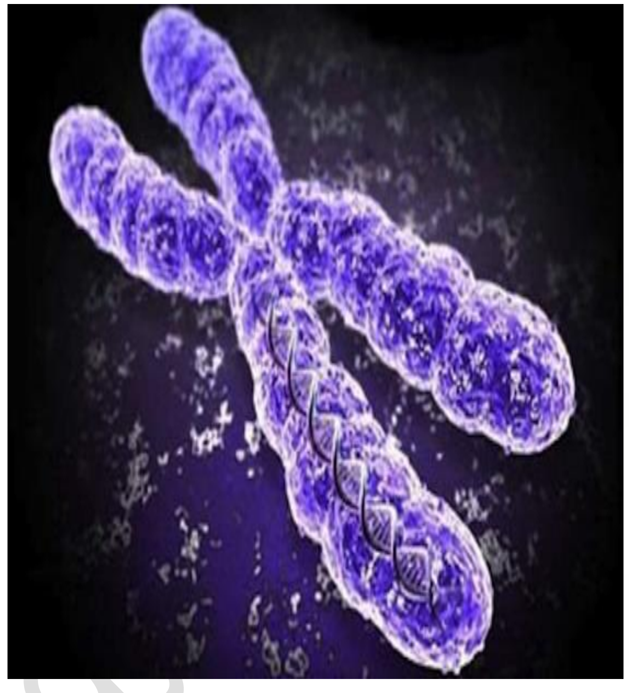
Lesson 1: cell division

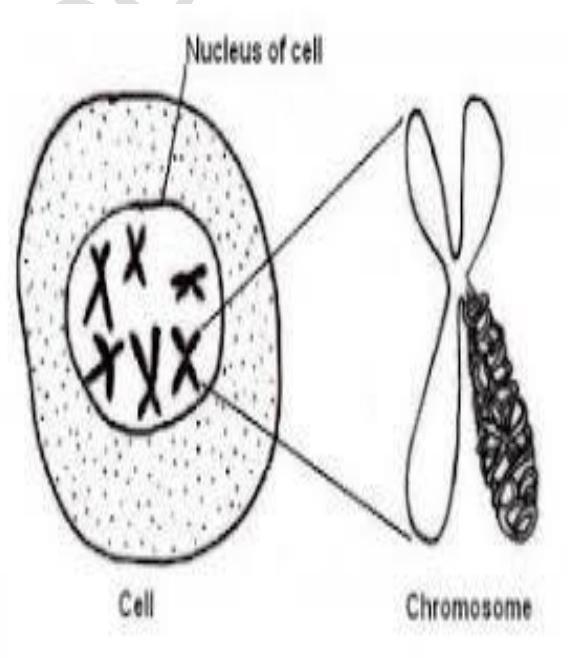
There're 2 types of the multicellular living organisms:

1-somatic cells(all body cells except reproduction cells): a-in humans and animals(cells of liver, kidney, skin). b-in plants(cells of root ,stem ,leaves).	2-reproductive cells: a-in humans and animals (testes and ovaries cells). b-in flowering plants (anthers and ovaries cells).

Chromosomes:

All types of cells contains thread like bodies called chromosomes and have the main rule in cell division.





Chromosome: thread like bodies present in cells "nuclei" ,they represent the genetic material of the living organisms.

Structure of chromosome:

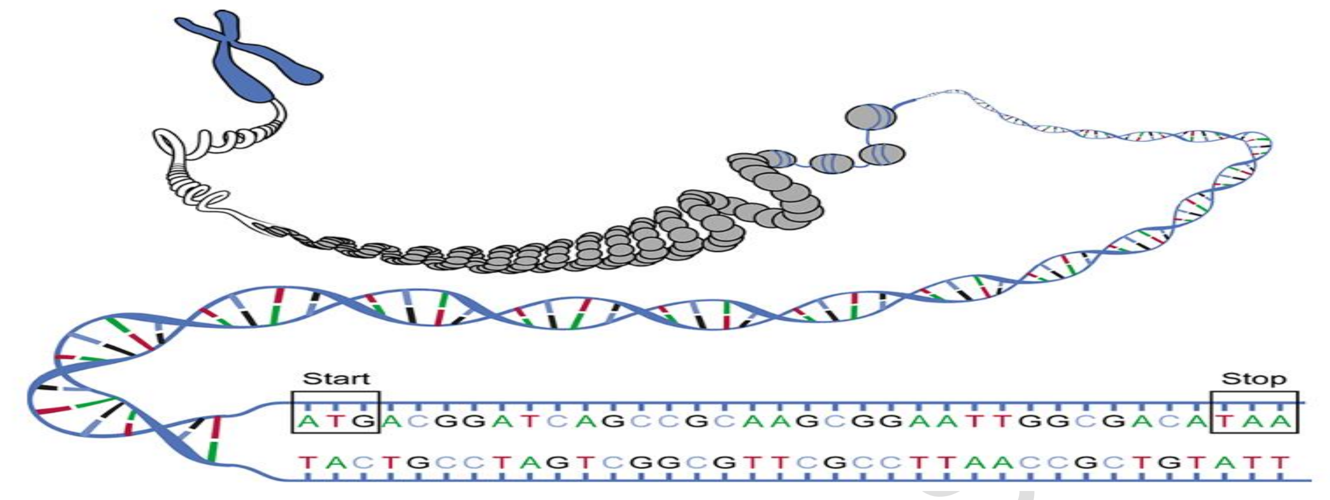
a-general structure: 2connected threads, each one called"**chromatid",** the chromatid connected at a point called"centromere"

centromere: it's the point of connection of the 2 chromatids of the chromosome.

b-chemical structure:(1-nucleic acid called "DNA", that carries the genes that

carries the genetic traits of the living organisms.

2-protien"DNA"it's the nucleic acid that carries the genetic traits of the living organism.)



Number of chromosomes:

1-it differs from one species to another.

2-it's fixed in the members of the same species.

3-in somatic cells and reproductive cells differs from those in the gametes for the same organisms as follow:

a-somatic cells and reproductive cells: each one contains a complete number of chromosomes, one from male gamete and other from female gamete, the number of chromosomes is diploid number (2N).

b-gametes (male gametes {sperms},female gametes{ova}):each one contains a half number of chromosomes present in reproductive cell or somatic cell, the number of chromosomes is haploid number(N).

Importance of chromosomes:

1-theyrepresent the genetic material of the living organisms.
2-they have the main role in cell division .
3-knowing the number of the chromosomes helps in identifying the animal and plant species.

Cell division: it allows the cell to divide into 2 cells or more ,to aim to the growth reproduction.

Types of cell division: there're 2 types:

1-mitotic cell division{mitosis}or indirect cell division.	2-meiotic cell division{meiosis}or reduction cell division.

1-mitotic cell division (mitosis)

It's the kind of cell division that occur in the somatic cells ,and the cell is divided into 2 new cells(somatic), each one contains the same number of chromosomes(diploid number) of the parent somatic cell.

Site of occurrence :in the somatic cells only ,such as :

1-paanceriatic cells ,skin ,liver ,kidney(humans and animals).
2-root cells ,stems, leaves ,seeds (plants).

Importance of mitosis:

1-compensation of the damaged cells.
2-completing the asexual reproduction process.
3-growth of living organisms (the growth of seed by mitosis to complete plant).

Phases of mitosis:

Before starting the mitosis the cell go through a phase called interphase .
Interphase: it prepares the cell for division by :
1-occurrence of some important biological processes.
2-duplication the amount of the genetic material(DNA).
Interphase: it's the phase that occur before starting the cell division process ,as the cell prepares for cell division by the occurrence of some important biological processes and duplicating the amount of the genetic material(DNA).
The phases are:

Interphase
The nucleolus and the nuclear envelope are distinct and the chromosomes are in the form of threadlike chromatin.

Nucleolus
Chromatin
Nuclear envelope

Prophase
The chromosomes appear condensed, and the nuclear envelope is not apparent.

Metaphase
Thick, coiled chromosomes, each with two chromatids, are lined up on the metaphase plate.

Anaphase
The chromatids of each chromosome have separated and are moving toward the poles.

Telophase
The chromosomes are at the poles, and are becoming more diffuse. The nuclear envelope is reforming. The cytoplasm may be dividing.

Cytokinesis
Division into two daughter cells is completed.

The change that occur in the telophase called adverse changes because it's adverse to that in prophase.

Liver transplantation: some somatic cells like liver aren't divided in normal conditions but they retain the ability to divide under certain conditions:(ex: if the liver got injured the remaining cells undergo many mitosis divisions to compensates the missing part, this is the basis of the liver transplantation).

Liver transplantation process: performed to replace the infected patient's liver with a part of a healthy donor's liver ,in time ,the liver of each of them will complete itself due to the mitosis divisions.







2- meiotic cell division(meiosis):

It occur in the reproductive cells ,which the cell divides into 4 new cells (gametes),each cell contains half the number (haploid number)of chromosomes of the parent cells .

Site of occurrence:

In the reproductive cells only:

1-in humans and animals :it occur in the testes to produce male gametes (sperms)and in the ovaries to produce female gametes (ova).

2-in flowering plants: it occur in the anther to produce male gametes (pollen grains)and in the ovary to produce female gametes (ova or eggs).

Importance of meiosis: production of male gametes and female gametes to complete the sexual reproduction.

Phases of meiosis: before starting the cell go through interphase.

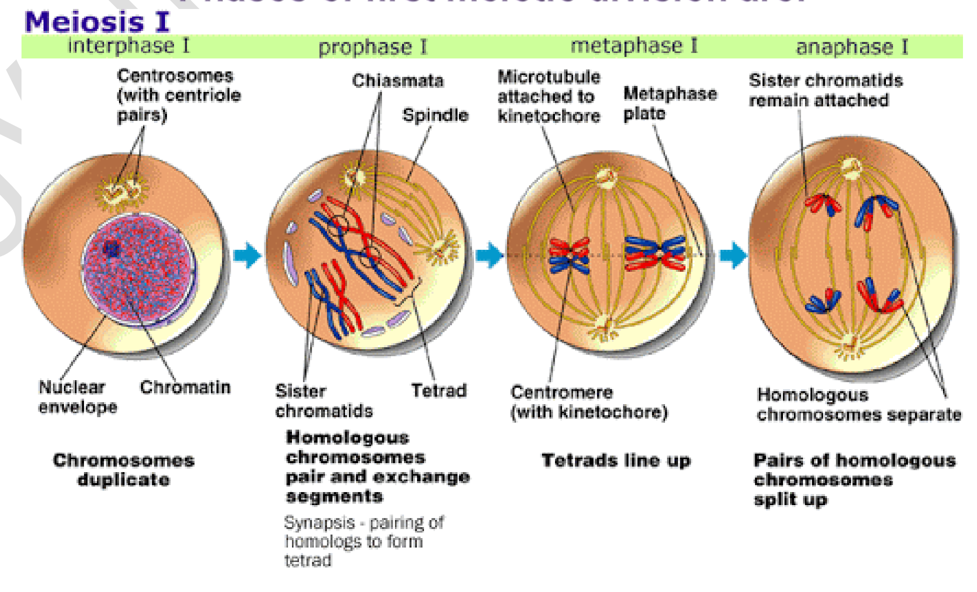
Meiotic division happens in 2 stages:

1-first meiotic division.	2-second meiotic division.

First meiotic division:

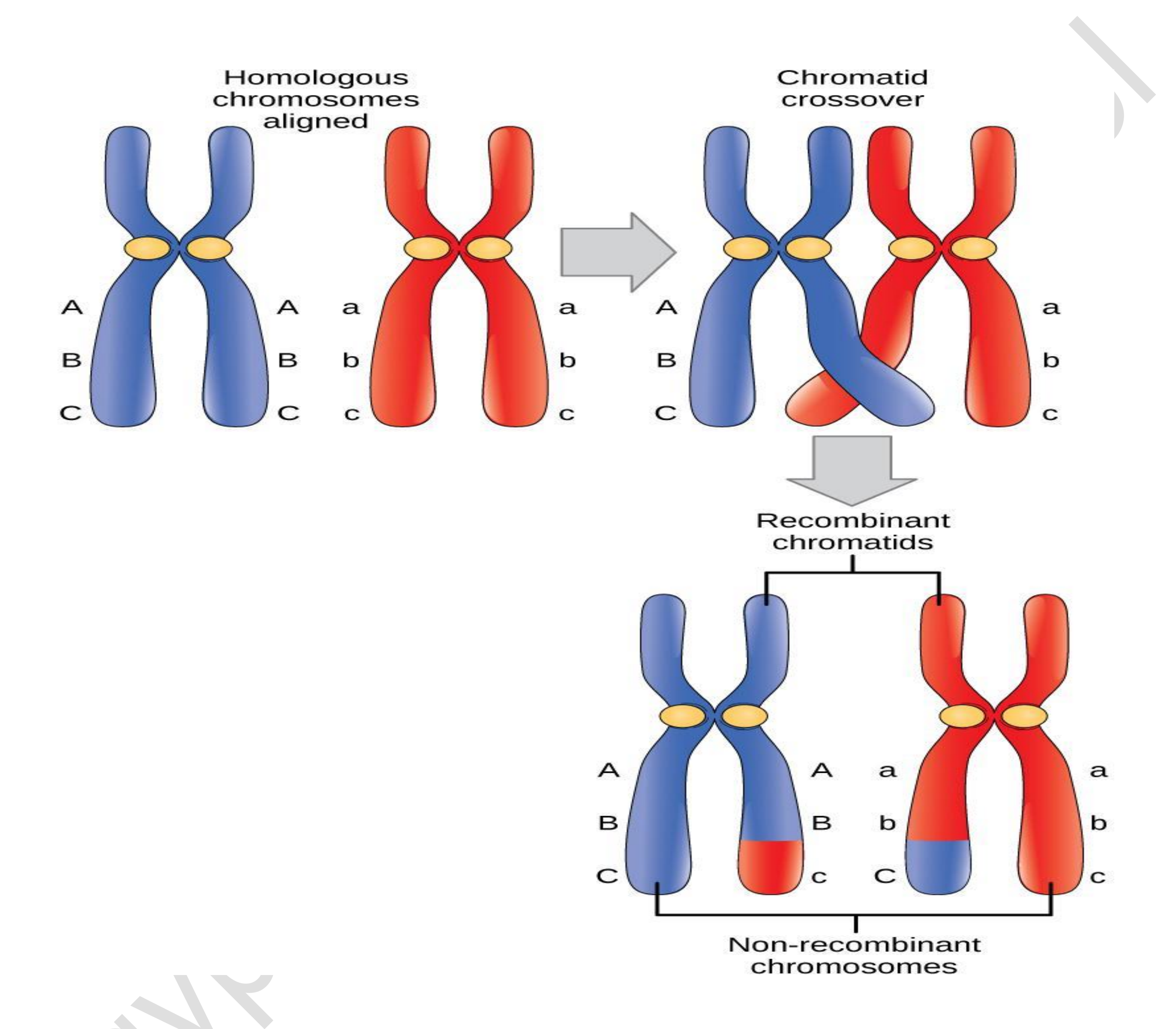
it produce 2 cells ,each one contains half the number of chromosomes.

Phases of first meiotic division are:



The crossing over phenomenon:

It's the phenomenon that happens at the end of prophase I which some parts of the 2 inner chromatids of each tetrad are exchanged to produce new genetic arrangement.



Importance of crossing over phenomenon:

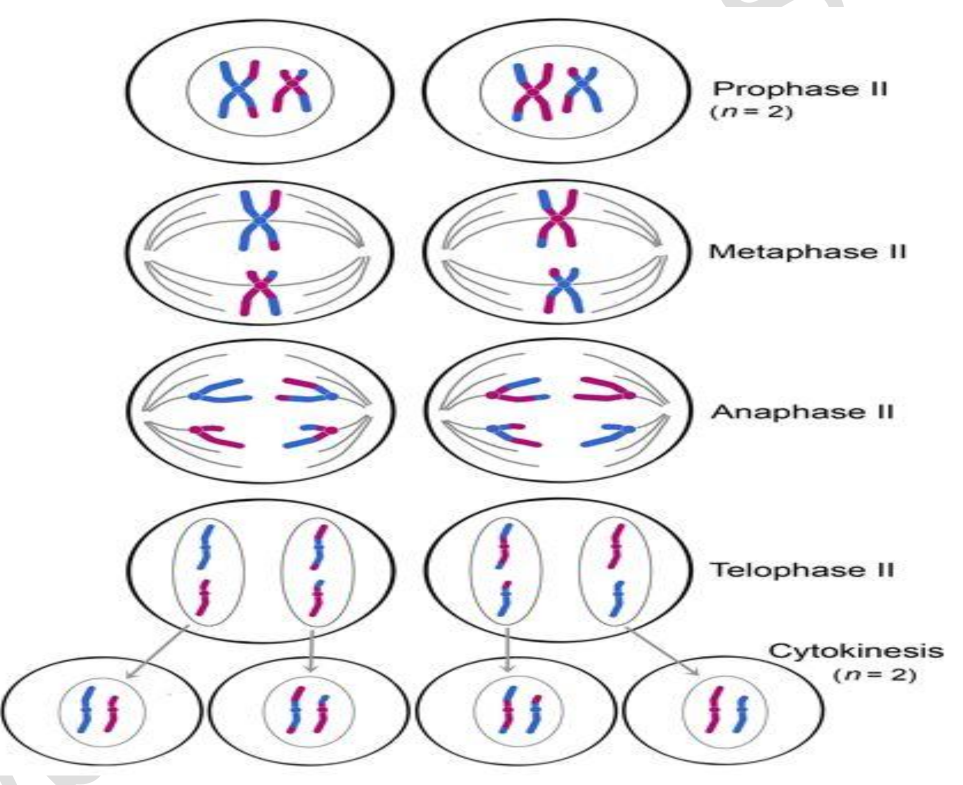
It works in the variation of genetic traits among the members of the same species, and it contributes in the exchange of genes between the two homologous chromosome's chromatids and distributing them randomly in the gametes.

Second meiotic division:

it aims to increase the number of the produced cells from the first meiotic division, each cell of the 2 resulted cells from the first division is divided a gain in similar way to the mitotic cell division.

In the final phase telophase II 4 cells are produced and each one contains half the number (haploid number) of chromosomes of the parent cell. (That's why the meiotic cell division called reduction division).

Phases of the second meiotic division:



Comparison between reproductive cells and gametes:

Points of comparison:	Reproductive cell:	Gamete:
#of chromosomes:	Diploid number(2N).	Haploid number(N).
Type of division:	Meiotic cell division.	Gamete isn't divided.
Importance:	Production in gametes.	Occurrence of sexual reproduction process.
Examples, location:	Testes ,ovaries in human and animals. Anthers ,ovaries in plants.	Sperm ,ovum in humans and animals. Pollen grain ,ovum in plants.

Comparison between the mitotic division(mitosis) and meiotic division(meiosis):

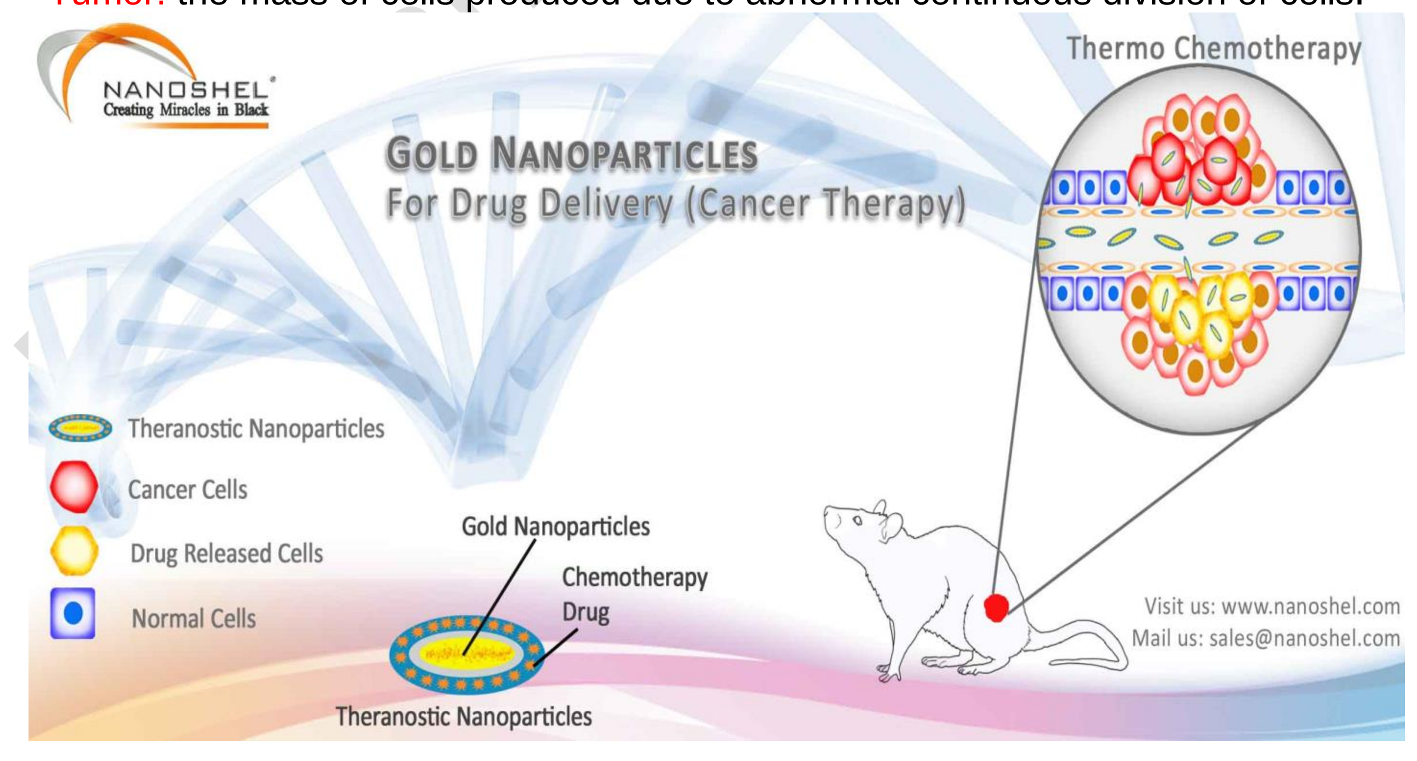
Points of comparison:	Mitosis:	Meiosis:
Site of occurrence:	In somatic cells except neural cells and red blood cells.	In reproductive cells.
Importance:	Growth of living organisms, Compensation of damaged cells, Completing asexual reproduction process.	Formation of gametes, In male: sperms or pollen grains, In female: ova or ovules.
Resulting cells:	2somatic cells ,each contain the same number of chromosomes (2N) of the parent somatic cell.	4 gamete cells, each contains a haploid number(N) of chromosomes of the parent reproductive cell.
Stages of division(phases):	1 stage including 4 phases: prophase, metaphase, anaphase ,telophase.	2stages: First meiotic division Second meiotic division,(each one include 4 phases)

Comparison between somatic cell and reproductive cell:

Points of comparison:	Somatic cell:	Reproductive cell:
#of chromosomes:	Diploid number(2N)	
Type of division:	Mitotic division(neural cells and RBCs aren't divided)	
#of resulting cells:	2somatic cells resulted from the division of somatic cell, each one contains the same number of chromosomes as the parent cell.	4 gamete cells resulted from the division of reproductive cell, each one contains a haploid number (N)of chromosomes of the parent reproductive cell.
Examples or location:	All body cells except reproductive cells like: liver, kidney ,skin ,in humans and animals. Roots ,stem ,leaves in plants.	Testes and ovaries cells in humans and animals. Anthers and ovaries cells in plants.

Nano technology and cancer treatment:

Cancer occur when some cells of the body are divided continuously in abnormal way without controlling leading to form amass of cells which called tumor.
Tumor: the mass of cells produced due to abnormal continuous division of cells.



1-discovering cancer disease : Discovered by the nano-technical as follow:
It started by loading proteins that have ability to attach on the cancerous cell secretions, with nano-molecules of gold and then injecting them into the patient ,the loaded proteins with nano-molecules of gold pass from the blood of the patient then attach on the cancerous cell surface to monitor it through a microscope ,each cell separately.

2-treatment of cancer:
a-by using loaded protein with nano-molecules of gold :focusing laser to certain degree to the nano-molecules of gold (present on the cancer cells), then the nano-molecules of gold absorb the light energy and convert it into heat energy which burns and kills the infected cancer cells ,and the healthy cell won't be affected.
b-by using smart microscope bombs: using nano-technology, they developed smart microscope bombs that penetrate the cancer cells and explode them from inside, they were used to kill cancer cells in experimental mice, they suffered from cancer were able to live 300 days after this treatment ,as those who didn't receive the treatment they didn't live more than 43 days.

Worksheet:

1- write the scientific terms:

1-The part in the cell which is responsible for cell division (…………………………..)

2-Fibers extends between the two poles of the cell in prophase. (………………..……..)

3-It consists of two chromatids connecting together with the centromere. (………………………)

4-It occur at the end of the first prophase of the meiotic division, in which the inner parts of chromatids are exchanged. (………………………………..)

5-The phase in which the chromosomes are arranged in the equator of the cell(…………………..)

2-Compare between:

1-Somatic cells and gametes in accordance to the number of chromosomes.

2-Mitotic and meiotic divisions in accordance to the place of occurrence and the aim of division.

3- choose the correct answer:

1-The cell prepare itself for the mitotic division in …………………..

a-Prophase b-Interphase c-Metaphase d-Telophase

2-The centromere of each chromosome is divided vertically, then the two chromatids are separated from each other in the ………………………….

a-Prophase b-Telophase c-Anaphase d-Metaphase

3-The chemical structure of the chromosome is …………………..

a-The nucleic acid DNA b-Protein c-Carbohydrates d-A,B together

4-right or wrong:

1- the chromosomes are found inside the cytoplasm of the cell.( )
2-chromosomes are rounded bodies.( )
3-yhe gametes contain the diploid number of chromosomes.( )
4-the number of chromosomes in somatic cells is haploid.( )
5-the chromosomes consists of 2 chromatids connected at the cytoplasm.( )

5-write the scientific term:

1-cellular division which leads to the formation of gametes.
2-they are thread like bodies that have the main role in cell division.

Lesson 2: sexual and asexual reproduction:

Reproduction process: it's a biological process, where the living organism produces new individuals of the same kind and so ensuring it's continuity.

Importance of reproduction:
It produces new individuals of the same kind and preserve them from extinction.

Types of reproduction:

Asexual reproduction:	Sexual reproduction:
Occurs by only one living organisms, Mostly occurs in single-celled living organisms(yeast, amoeba)	Occurs through 2 living organisms, one male and one female, Occurs in the most higher living organisms(plants ,animals humans)

Asexual reproduction:

It's a process that a living organism produces new individuals with genetic traits identical to those of their parent.

Occurs in:
1-unicellular living organisms(single-celled):(yeast, bacteria, amoeba)
2-some multicellular animals and plants:(hydra, mushroom, starfish).

Properties of asexual reproduction:

1-happens by only one living organism.
2-doesn't require special system or structure in living organisms.
3-happens by mitotic division.
4-keeps the genetic structure of the living organisms, because it produces new individuals identical in genetic structure to the original living organism during mitotic division.

Types of asexual reproduction: reproduction by

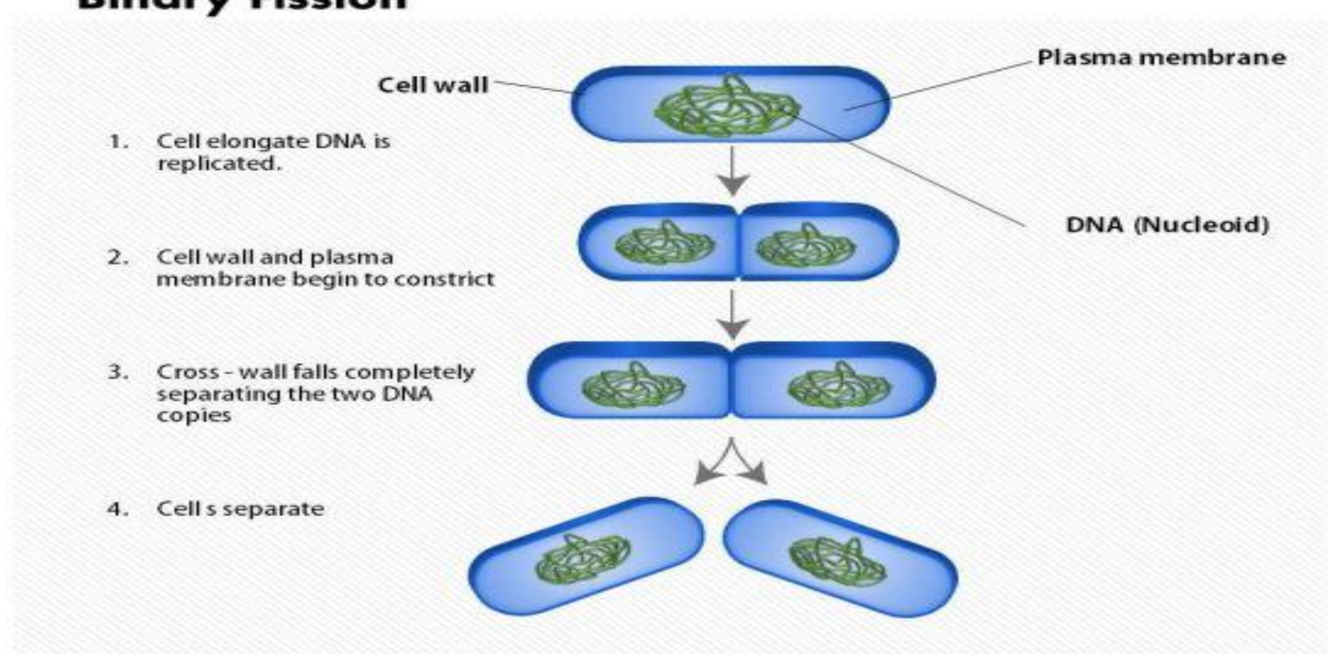
1- Binary fission	2- budding	3- regeneration	4- Spore propagation	5- reproduction

1-reproduction by binary fission:

Occurs in unicellular living organisms like:

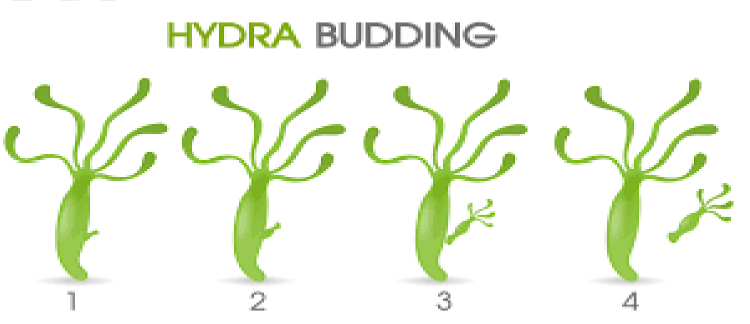
a) Unicellular protozoans: amoeba, paramecium, and euglena.
b) Simple algae and bacteria.

Reproduction by binary fission: it's a type of asexual reproduction where the nucleus divides mitotically, then the cell splits into 2 identical cells.



Reproduction by budding:

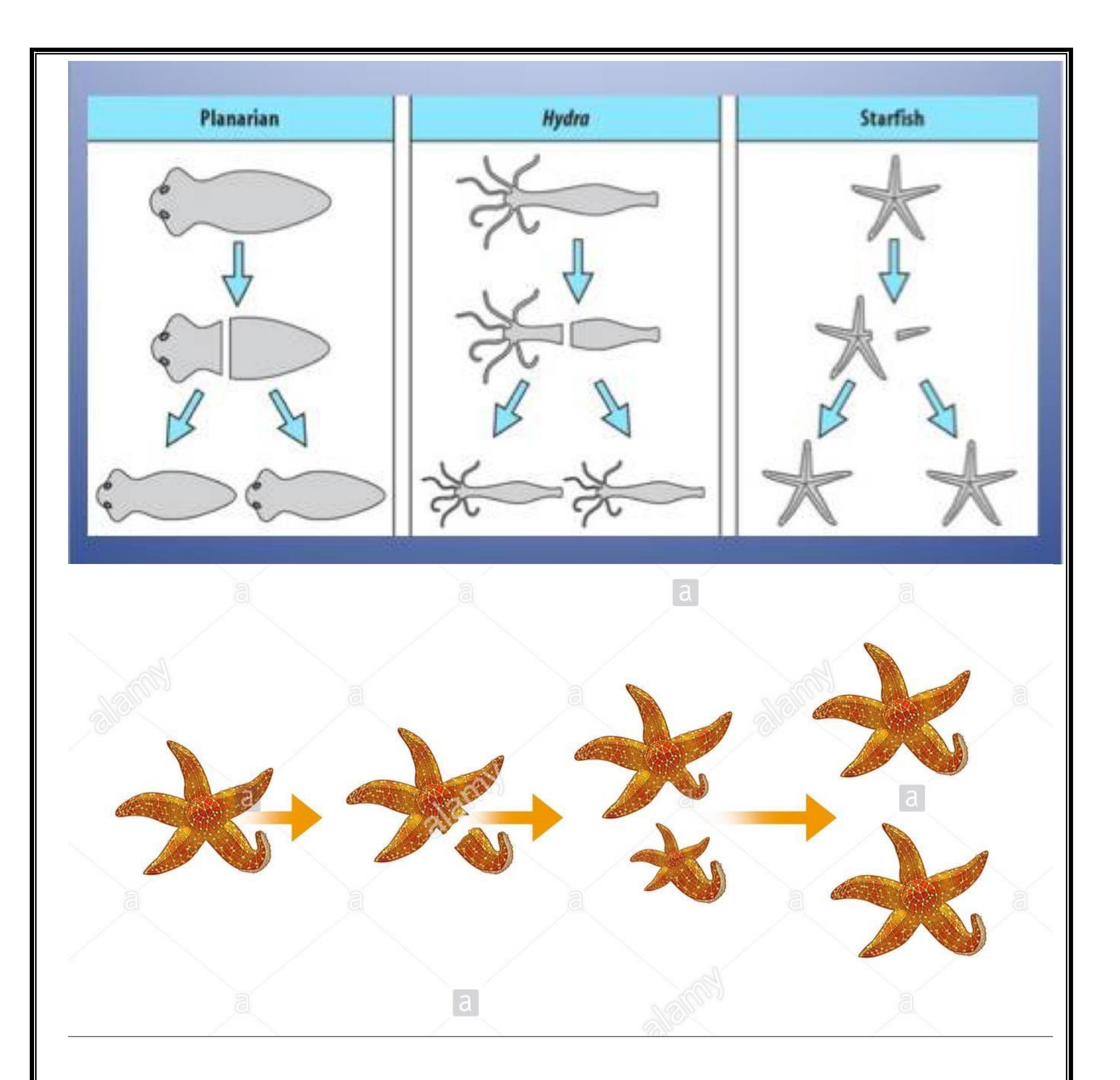
Occurs in unicellular organisms like yeast and fungus,in multicellular organisms likehydra and sponges.



Reproduction by budding: It's a type of reproduction that produces new individuals by formation of buds in the parent cell.

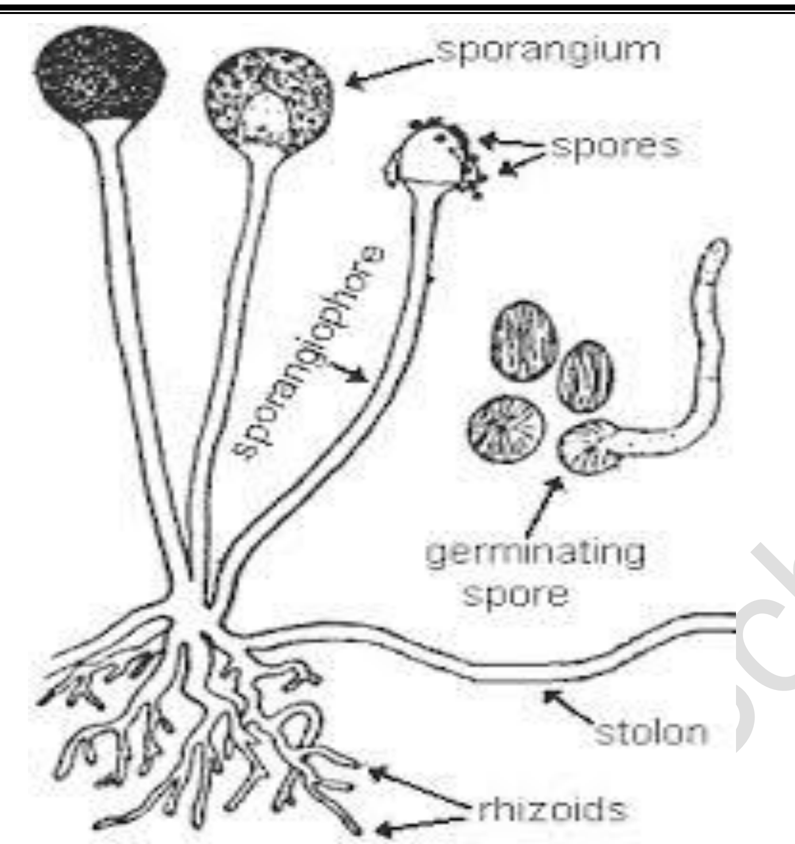
Reproduction by regeneration:

Occurs in multicellular living organisms like starfish.
Regeneration :it's the ability of animal to compensate their missing parts.
Reproduction by regeneration: It's the ability of the missing part in some organisms to grow forming a complete organism identical to the parent individual.



Reproduction by sporogony (spore propagation):

occurs in :some fungi like bread mold, mushroom and some algae.
Reproduction by spore propagation: it's type of asexual reproduction occurs in some fungi and algae by producing spores.



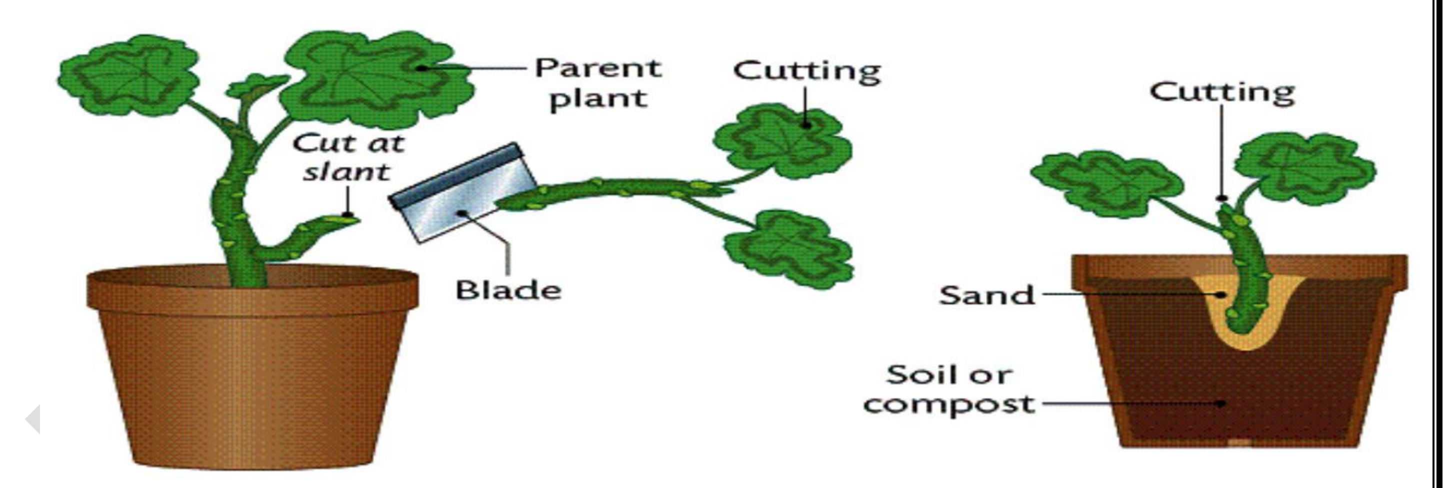
Vegetable reproduction:

Occurs in :plants ,vegetative organs like leaves ,roots , stems ,in order to produce new plants identical to the parent plant.

Vegetative reproduction occur by mitotic division, naturally by :plant's vegetative organs (leaves ,roots ,stems).

And artificially: in many ways like tissue culture.

Vegetable reproduction :it's a process by which a living organisms that happens in plant's vegetative organs without the need of seeds.



<u>**Sexual reproduction:**</u>

It's a process that a living organism produces new individuals with traits differ from parents.

Occurs in :most multicellular higher living organisms of the plants and animals.

Properties of sexual reproduction:

1-Occurs between 2parental individuals ,male and female.
2-Happens by special reproductive organs and system.
3-Happens by meiotic division.
4-Doesn't keep the genetic structure of the living organisms.

1-gametes formation. 2-fertilization.

1- gametes formation: gametes of male and female are formed in the living organisms as a result of the meiotic division for its reproductive cells, gametes contain a half number of the chromosomes (N) of the organisms reproductive or somatic cells(2N).

2-Fertilization:it's the combination of a male gamete(N) and a female gamete(N) to dorm a zygote(2N).

The zygote contains genetic material from both parents and when it grow ,it gives a new offspring with genetic traits of its parents.

The zygote: it's a cell produced due to fertilization and it contain the complete number diploid number (2N)of chromosomes of the living organisms.

Comparison between sexual and asexual reproduction:

Sexual reproduction	Asexual reproduction
Occurs by 2 living organisms ,male and female .	Occurs by one living organism.
Occurs in most ()multicellular)higher living organisms of plants and animals.	Mostly occurs in unicellular celled living organisms
Depends on the meiotic division.	Depends on the mitotic division
Requires special reproduction organs and system in the living organisms.	Doesn't require special system or structures in the living organisms.
The new offspring combines between the genetic traits from the male and female.	The new offspring gets a full copy of the parent individual's genetic material.

Worksheet:

1- Explain by drawing, how are gametes produced by sex cells through the meiotic division.

2- sexual reproduction is a source of genetic variation………. Explain.

3- write the scientific terms:

1-The process in which the living organisms produces new individuals carry genetic traits identical to their parents. (……………………………………….)

2-The most common asexual reproduction in fungi and algae (……………………………….)

3-it has genetic material from both parents and during growth gives new individual carries the traits of both parents. (……………………………………….)

4-A type of asexual reproduction occur in yeasts and sponges (…………………….……….)

5-The ability of some animals to compensate the missing parts. (…………………………………......)

4-choose the correct answer:

1-through reproduction process,…………transfer from parents to their offspring.
a-genetic traits b-organs c-gametes d-hormones

2-…………reproduction mostly occurs in single-celled living organisms.
a-sexual b-asexual c-mitotic d-meiotic

3-the unicellular protozoans such as amoeba and paramecium reproduce by…………..
a-binary fission b- budding c- regeneration d- spores

4-the ability of some animals to compensate their missing parts is called…………
a-budding b-sporangium c-sexual reproduction d-regeneration

5-correct the underlined words:

1-Euglena reproduce asexually by <u>budding.</u>
2-gamete contain <u>diploid</u> number of chromosomes.
3-sexual reproduction takes place in plants by <u>spores.</u>
4-reproductionby spore propagation occurs in <u>paramecium</u>
5-<u>Asexual</u> reproduction is a source of genetic variation.

1 Cairo Governorate

Answer the following questions :

Question 1

A Complete the following sentences :

1. The image can be received on a screen is called .... image.
2. At the end of ...., the nucleolus and the nuclear membrane disappear at the mitotic division.
3. The sun takes about 220 million years to complete one cycle around the center of ....
4. The chromosome consists of two connected threads at the .... , each is called ....

B What is meant by ... ?

1. The light reflection phenomenon.
2. Average speed.
3. Reproduction.

C A train starts to move from rest in straight line, its speed reaches 36 m/sec. after 9 second. **Calculate** the acceleration of the train, and **find its type**.

Question 2

A Choose the correct answer :

1. Bread mold fungus reproduces asexually by ....
   a. regeneration b. binary fission c. budding d. sporogony
2. The two gases that have produced galaxies, stars and the universe over millions of years are ....
   a. Helium and Oxygen b. Helium and Nitrogen
   c. Helium and Hydrogen d. Oxygen and Hydrogen
3. The virtual-upright magnified image formed in case of ....
   a. concave lens b. convex mirror
   c. plane mirror d. concave mirror and convex lens.
4. The distance moved through a unit time is ....
   a. acceleration b. displacement c. length d. speed
5. The crossing over phenomenon occurs at the end of ....
   a. prophase I b. metaphase I c. anaphase I d. telophase I

B Mention the type of physical quantity of each :

1. Mass.
2. Force.

C Illustrate with drawing the image formed by concave mirror when the object is at the center of curvature of the mirror, then mention the properties of this image ?

Question 3

A Re-write the following statements after correcting the underlined word :

1. When an object move by **relative speed** it cover equal distances in equal periods of time.
2. The solar system consists of the sun and **seven** planets that rotate around it.
3. The number of chromosomes in the human somatic cell is about **a quarter** of those in gametes.
4. The scientist **Fred Hoyle** established the theory of nebula to explain the origin of solar system.
5. The short-sightedness is treated by using a **convex lens**.
6. **Regular speed** is the value of displacement in one second.

B What would happen in the following cases :

1. Combination of the male gamete and female gamete.
2. The incident light ray falls passing the focus of the convex lens.

C Give reasons for :

1. The long-sightedness person can't see the near objects clearly.
2. The focal length of concave mirror can be determined by knowing its radius of curvature.

Question 4

A Write the scientific term for the following statements :

1. The covered distance at certain direction.
2. The value of change of an object's speed in one second.
3. The angle between the reflected light ray and the perpendicular line on the reflecting surface from the point of incidence.
4. The ability of some animals to compensate their missing parts.
5. Physical quantity which has magnitude only and has no direction.
6. Change of an objects position as time passes according to the position of another object.

B Compare between each of the following :

1. Acceleration and deceleration.
2. Somatic cells and reproductive cells (in terms of its types of the cell division).

Giza Governorate

Answer the following questions :

Question 1

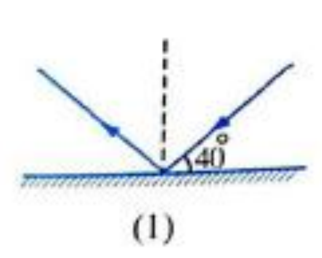
A Choose the correct answer :

1. Which of the following are consider from vector physical quantities ? ....
   a. mass and force
   b. displacement an acceleration
   c. radius and distance
   d. force and time
2. The object's image that formed behind plane mirror always is ....
   a. virtual, magnified and erect
   b. real, diminished and inverted
   c. real, equal to the body and reversed
   d. virtual, equal to the body and erect
3. The scientist who established the modern theory of origin the solar system is ....
   a. Fred Hoyle b. Laplace c. Moulten d. Newton
4. Chromosome is chemically consists of nucleic acid .... and protein.
   a. HNO_3 b. H_2SO_4 c. DNA d. HCl

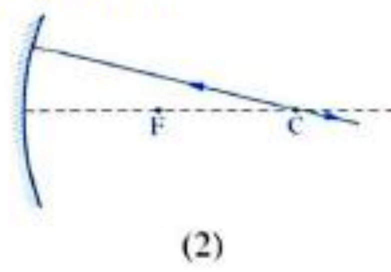
B A racer cover a distance (50 meter) by running within a time (5 second), then return to the start point walking within (20 second). Calculate average speed of the racer :

1. While running
2. While returning back.

C Calculate the value of reflecting angle in both the two figures :



(1)



(2)

Question 2

A Complete the following statement :

1. When object speed decreases by passing time, then it moves at .... acceleration.
2. If the focal length of a convex mirror is (10 cm), then its radius of curvature of its reflecting surface equal ....
3. Distance in space is measured by .... unit.
4. The .... division occurs in liver cells.

B An object is placed at (3 cm) from the optical centre of a lens, then a magnified virtual image for the object is formed :

1. Mention the type of lens.
2. Explain by drawing the path of the rays that form the object's image.

C What happen :

1. When combination of male gamete with female gamete to form zygote.
2. To the acceleration of an object moves at uniform speed.

Question 3

A Write scientific term for the following statements :

1. The distance covered at a certain direction from the primary position of movement towards its final position.
2. The distance between principle focus and optical centre of the lens.
3. The process of exchanging the two inner parts of chromatids of each tetrad.
4. It is the wide and extended space that contains galaxies.

B Compare between each of the following :

1. Speed – velocity (according definition).
2. Amoeba and yeast fungus (according to the type of asexual reproduction).

C What is the name of the phase where the following changes occurs during cell division :

1. Chromosomes are arranged along the equator of the cell.
2. Doubling the genetic material.

Question 4

A Correct the underline words :

1. For identifying force it is necessary to know its **magnitude only**.
2. Lens is transparent medium that **reflect** light and it is limited with two spherical surface.
3. The **Big Bang** theory depends on the presence of something that looks like cloud or nebula in space.
4. Gamete contain **diploid** number of chromosomes.

B Give reasons for :

1. The train moves with an irregular speed.
2. Sexual reproduction is a source of the variation between individual.

C What is meant by ... ?

1. The relative speed of car relative to a moving observer equals zero.
2. Meiosis division is a reduction division.

3 Alexandria Governorate

Answer the following questions :

Question 1

A Complete the following sentences :

1. The actual length of the path that a moving object takes from the starting point of movement to the end point is known as .... and it is considered as .... physical quantity.
2. The image always equals the object and can't be formed on a screen in the .... mirror.
3. In case of the .... division of the cells no changing in the genetic traits.

B A runner covered a distance of 240 meters in 16 seconds, then he returned back walking to the start point in 2 minutes. Calculate the average speed of his complete trip.

C Define the following :

1. The universe.
2. Reproducing by regeneration.

Question 2

A Choose the correct answer :

1. The graphic relationship between distance and time which is represented by a straight line pass by the origin point is ....
   a. irregular speed
   b. uniform speed
   c. irregular acceleration
   d. uniform acceleration
2. From physical quantities that is enough to be identified knowing its magnitude only is ....
   a. the force
   b. the displacement
   c. the acceleration
   d. the mass
3. The formed image of an object in the concave lens at any distance is ....
   a. virtual diminished
   b. virtual enlarged
   c. real diminished
   d. real enlarged
4. According to Laplace theory in 1796, the solar system was a glowing gaseous sphere known as ....
   a. the sun
   b. the planets
   c. the stars
   d. the nebula
5. It is possible to produce new plants identical to the mother plant by ....
   a. forming gametes
   b. fertilization
   c. budding
   d. tissue culture

B Give reasons for the following :

1. The word Ambulance is written laterally inverted on Ambulance car.
2. Binary fission is considered as a mitotic division.

C What is the measuring unit of the displacement ?

Question 3

A Write scientific term for the following statements :

1. The speed of a moving object relative to a standing or a moving observer.
2. A spherical mirror its shining surface is a part of the outer surface of the sphere.
3. Millions of the stars which arranged in a distinctive shape.
4. Special organs for reproduction in algae and fungi.

B When do the following happen :

1. Passing of a light ray through a lens without refraction.
2. Moving of an object with a negative uniform acceleration.

C 1. Illustrate how the real equal image of an object is formed in the mirrors.

2. The opposite figure shows a phenomenon happens in the living organisms, **mention** :

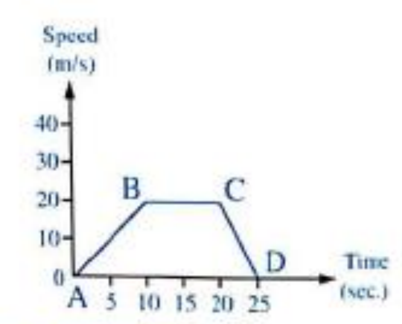


a. The name of the phenomenon.

b. The name of the phase in which the phenomenon occurs.

Question 

A The opposite graph represents the movement of a car from rest point, study the graph and answer :



1. Moving with uniform acceleration is represented by the straight line ....
2. Calculate the acceleration of the car during its movement from the point (B) to (C).

B Compare between short-sightedness and long-sightedness concerning :

1. The radius of the eyeball.
2. The type of lens that is used in treatment.

C What is the importance of the following :

1. The attraction force of the Sun.
2. The nucleic acid in the chromosome structure.
3. The anther in the flowering plants.

4 Kalyoubia Governorate

Answer the following questions :



Question 1

A Choose the correct answer :

1. The convex lens which has great thickness from the following, its focal length is ....
   a. 4 cm b. 6 cm c. 8 cm d. 10 cm
2. The binary fission reproduction takes place in ....
   a. Amoeba and Hydra b. yeast and bacteria
   c. Amoeba and sponge d. Bacteria and Euglena
3. The two gases which present within minutes of Big Bang are ....
   a. Hydrogen and helium b. Hydrogen and oxygen
   c. oxygen and Helium d. Hydrogen and nitrogen
4. From the scalar physical quantities ....
   a. radius and area b. time and force
   c. acceleration and speed d. mass and displacement
5. Which of the following organs show the right number of chromosomes ?

The choice	a.	b.	c.	d.
The organ	liver	testes	uterus	ovaries
Its cells has (2n)	✓	×	×	✓
Produce cells has (n)	✓	✓	×	✓

B What are the results which happens due to the following .... ?

1. A nuclear explosion for a star near the sun (according to Fred Hoyle theory)
2. A starfish loses one of its arms which has a part of the central disc.
3. Putting an object in front of convex lens at its focus.

C Study the following figure which explains the steps of one of the biological phenomenon, then answer the following questions :



1. What's the name of this phenomenon ?
2. Mention the phase in which that phenomenon occurs.
3. What is the type of its division ?
4. What are the results which are produced if that phenomenon did not happen ?

Question 2

A Write the scientific term of each statement from the following :

1. Asexual reproduction occurs by different parts of the plant without needing seeds.
2. The actual length of the path that a moving object covers from the starting point to the ending point.
3. Arrangement, harmony and distinctive shapes of the groups of stars in the universe.
4. Thread like bodies present in the cell's nuclei and they represent the genetic material of the living organism.
5. An optical piece that is used to treat a vision defect which causes the formation of image in front of the retina.

B Two cars start their movement on an inclined road at the same moment, the first car rises up the inclined road with regular speed equal 30 m/sec. and the second car moves down the inclined road with initial speed equal 10 m/sec, and uniform acceleration of 5 m/sec^2. If the two cars meet each other after 5 seconds passes from that moment find the relative speed of the first car that is observed by the driver of the second car when meeting of the two cars.

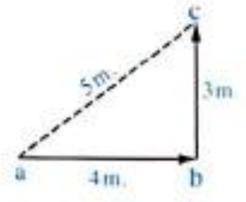
C When will the following things happen ... ?

1. The distance covered by a body equals the amount of its displacement.
2. Reflection of light ray falls on spherical mirror on itself.

Question 3

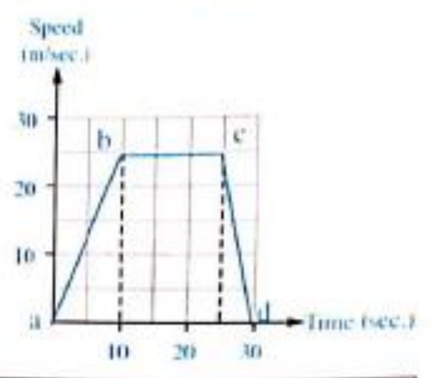
A Rewrite the following statements after correcting the underline word :

1. If the angle between the incident light ray and the reflecting surface equal 30°, so the angle of reflection equal <u>**30°**</u>.



2. In the opposite figure an object moves Eastward from point (a) to point (b) during two seconds, then to point (c) Northward in 3 seconds, so its velocity through that period is <u>**1.4 m/sec**</u>.
3. Yeast fungus reproduces asexually by <u>**regeneration**</u>.
4. An object moves in a circular path its radius (r) to cover a distance equal (πr), so its displacement equal <u>**2 πr**</u>.
5. When the object covers the double of distance at the same time, so its speed <u>**decreases to quarter**</u>.

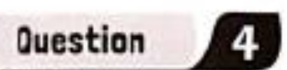
B A car moves in straight line, and its speed recorded within 30 seconds, then it was represented graphically as shown in the opposite figure :
From the graph extracts the needed information to complete the following table :



Phases of the car movement	phase a b	phase b c	phase c d
The initial speed (V_1)	.... (1)	25 m/sec	.... (2) ....
The value of acceleration	2.5 m/sec^2	.... (3)	.... (4) ....
The description of movement	.... (5)	.... (6)	The car moves with negative acceleration

C Mention one difference between each of the following :

1. Regular speed and irregular speed.
2. The virtual image of an object which is formed by each of concave lens, and convex lens.



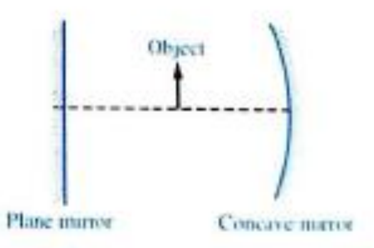
Question 4

A Give reasons for each of the following :

1. Pilots take in consideration the velocity of the wind during flying.
2. The mitotic division is very important for the child's body and not the meiotic division.
3. The universe is in a continuous expansion.
4. Most of people can't write in a correct way, while they are seeing the paper through a plane mirror.
5. The reproduction by spores is one of the forms of asexual reproduction.

B In the opposite figure :

An object was put in the mid distance between a concave mirror (its focal length is 10 cm) and a plane mirror, so the image was formed by the plane mirror at a distance 30 cm from the plane mirror.



1. Draw the path of light rays for the formed image by the concave mirror.
2. Mention the properties of the formed image by using the concave mirror.

C Mention the name of the phase in which the following changes occur during the cell division :

1. At its end the nucleolus and nuclear membrane disappear.
2. Two identical and separated groups of chromatids are formed.

5 Menofia Governorate

Answer the following questions :

Question 1

A Write the scientific term for each :

1. The upright image that cannot be received on a screen .
2. A straight line that passes through the center of curvature of a mirror and its pole.
3. A phase of division during which the cell prepare itself by duplicating its genetic matter.
4. An optical piece thick at its middle and thin at the terminals.
5. A type of reproduction depends on one parent without production of gametes.

B Give reasons for :

1. The body that moves by uniform velocity has acceleration equal zero.
2. Sexual reproduction produces individuals different of their parents.
3. The gamete contains half number of chromosomes existed in the somatic cell.

C A body moves with constant velocity covering 300 meters in 10 seconds then it returns back to the start point during 50 seconds, calculate :

1. The average speed of the body during return back only.
2. The average speed of the body during going and returning together.

Question 2

A What is meant by each :-

1. The distance between pole of a spherical mirror and its primary focus is 10 cm.
2. The distance covered in fixed direction equal 100 m.

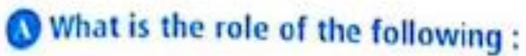
B What happened when a starfish loses an arm with a part of central disc.

C Compare between each :-

1. The acceleration and the mass (in term of type of physical quantity).
2. Bread mold fungus and Sponge (in term of the way of reproduction)
3. Big Bang theory and nebular theory (in term of their importance).
4. A train covers 72 kilometers in an hour and a car covers 30 meters in one second (in term of the magnitude of the speed)
5. Mitotic division and meiotic division (in term of the cells in which they occur).

D **An object placed at a distance of 15 Cm of the optical center of a symmetric convex lens, a real minimized image is formed for the object. then when the object is moved 5 Cm towards the lens, a real image equal to the object is formed, determine :**

1. The focal length of the lens.
2. Draw only the path of rays that explain the object and its image when it placed at a distance 15 cm of the lens optical center ?



A **What is the role of the following :**

1. The spindle fiber during cell division.
2. The chromosome

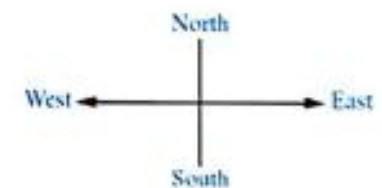
B **Determine the type of the optical piece (lens or mirror) then mention its type (concave – convex – Plane) when it is able to :**

1. Form a virtual upright minimized image in the same side of the object, whatever its distance of it.
2. Form a virtual upright enlarged image on the other side of the object, only if the object placed at a distance less than its focal length.

C **Complete the following by suitable words :**

1. The scientist who establish the crossing star theory that explains the origin of the solar system is ....
2. The ability of the liver to regenerate under certain conditions if injured represents the scientific base for .... surgery.
3. .... phenomenon is occurred between the inner chromatids of the tetrad.
4. The device that is used by the astronomers to identify the different wave lengths emitted by the Sun is ....

D **A person moved from start point (12) meters to the west then he returned in the same path 8 meters to the east calculate :**



1. The distance covered by the object from the start point.
2. The displacement (magnitude and direction).

Question **4**

A **Choose the correct answer :**

1. When a car moves by positive uniform acceleration of (6 m/sec^2) this means ....
   a. The car speed increases by the rate of (6 m/sec) every second.
   b. The car speed decreases by the rate of (6 m/sec) every second.
   c. The car covers 6 meters each second.
   d. The car acceleration increases by the rate of (6 m/sec^2) every second.



2. When incident light ray falls on a surface of a plane mirror then reflected as in the figure the reflecting angle equals ....

a. 60° b. 90°

c. 120° d. 30

3. If each muscle cell in a male rabbit contains 22 pairs of chromosomes, therefore number of chromosomes in a cell of testis wall equal .... chromosomes.

a. 44 b. 11 c. 22 d. 88

4. The image of near objects is formed behind the retina when these objects are placed in front of the eye of long-sightedness person because ....

a. The more convexity of the eye lens surfaces.

b. The decrease in the eye diameter.

c. The decrease in the focal length of the eye lens.

d. The increase in the eye diameter.

5. According to the nebular theory for the scientist Laplace, the nebula losses its heat gradually with the time which causes ....

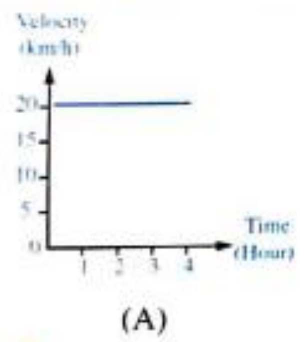
a. Decrease in the speed of rotation and increase in the volume.

b. The nebula takes spherical shape with increase its speed.

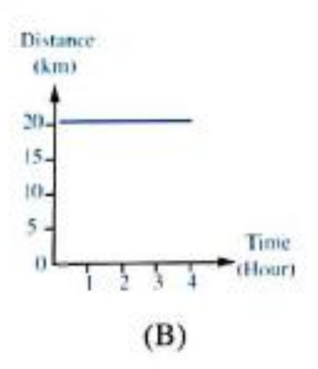
c. The nebula takes spherical shape only.

d. Decrease in the volume and increase in the rotation speed.

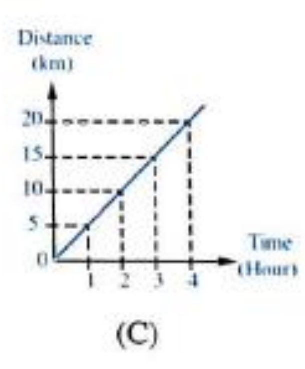
B Three cars (A, B, C) their motion are represented by the following graphs. Study the graphs then answer :



(A)



(B)



(C)

First :

1. The speed of car (A) equals (   ) km/h.
2. The speed of car (B) equals (   ) km/h.
3. The speed of car (C) equals (   ) km/h.

Second :

The relative speed of car (A) to an observer in car (C) when :

1. Both cars (A and C) move in the same direction equals (   ) km/h.
2. Both cars (A and C) move in opposite direction equals (   ) km/h.

6 Dakahlia Governorate

Answer the following questions :

Question 1

A Complete the following statements :

1. As the distance between the planet and the sun increases, the sun's gravitational force .... and its motion around the Sun becomes ....
2. The convex mirror is a part of a sphere, its .... surface is the reflecting surface and in the concave mirror .... surface is the reflecting surface.
3. In the animal cell, the spindle fibers are formed by .... , while in plant cell the spindle fibers are formed from .... at the cell poles.
4. .... reproduction in plant's happens by plant's organs without the need of ....

B 1. Show by drawing the relation (distance – time) graph for an object moves at a uniform speed and then it stops.

2. Sexual reproduction depends on two main processes, what are they ?

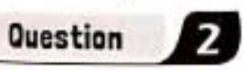
C A person can be seen near objects clearly but far objects seem distorted :

1. What is the name of this vision defect and what are its reasons.
2. How can you correct this defect, and give reason for your answer ?

D From the opposite figure calculate :

1. Total distance.
2. Displacement
3. Velocity after the first five seconds.

Displacement (m)
10
5
0
5
10
Time (sec.)



Question 2

A Correct the underline words :

1. Ahmed takes 10 minutes to transfer from his home to work moving at an average speed of 3 m/s, the distance between home and work **equal 3** km.
2. **The modern theory of the world** explains the origin of the universe.
3. The properties of the formed images by the convex lens depend on **the length** object from the lens.
4. The incident light ray passes through the center of curvature of a concave mirror, it reflects **parallel to its principle axis**.
5. **The focus** is the point lies in the middle of the reflecting surface of the mirror.
6. The relative speed of a moving car relative to constant observer **is less than** its real speed.

B An object was placed at a distance 20 cm from optical center of a lens then a real, diminished image is formed and when the object moves 8 cm toward the lens then a real, equal image to the object is formed :

1. What is the type of the lens and describe it ?
2. Calculate the focal lens of this lens.

C 1. Mention the general structure of the chromosome, show your answer with drawing and label it.

2. What is meant by :

1. Crossing over phenomenon.
2. Contact lens.

D What is the name of each living organism and mention the type of asexual reproduction in each :

1.



2.



Question 

A Write the scientific term of each of the following :

1. The rate of change of the distance.
2. Groups of stars that rotate together in space by the effect of gravity.
3. The image that cannot be received on a screen.
4. An apparatus is used to see the tiny bodies that cannot be seen by the naked eye.

B Give reasons for :

1. Asexual reproduction keeps genetic structure of the living organism.
2. Concave mirror is used to generate high heat energy.
3. Real image cannot be formed by using a concave lens.
4. The object speed increases by decreasing the time taken to cover a certain distance.

C Compare between each of the following :

Somatic cell and reproductive cell (according to) :

a. Type of division.

b. Number of the produced cell from division of one cell from each one.

D Show with drawing formation enlarged – erect image by using spherical mirror.

A Choose the correct answer :

1. .... is a scalar physical quantity.
   - a. time of tripe
   - b. the force
   - c. the pressure
   - d. displacement of object
2. Number of chromosomes in sperm is .... number of chromosomes in an ovum.
   - a. double
   - b. half
   - c. equal
   - d. quarter
3. The nucleolus and nuclear membrane disappear in ....
   - a. metaphase
   - b. telophase
   - c. prophase
   - d. interphase.
4. If you put an object in front of a plane mirror, the ratio between the length of the image and the length of the object is ....
   - a. more than one
   - b. not equal one
   - c. less than one
   - d. equal to one

B A car moves by regular speed equals 90 km/h on free road of Banha, then the driver used the brakes the car stops after 10 seconds, calculate the acceleration and what is its type ?

C What is the importance each of the following :

1. Interphase in cell division.
2. Convex mirror in your car.

D Show with drawing, and explain what happen in the following phases :

1. Anaphase
2. Anaphase I



Sharkia Governorate

Answer the following questions :

Question



A Write the scientific term of each of the following :

1. The value of change in the object speed in one second.
2. A mirror, always forms small image for the object.
3. It contains the Sun and the solar system.
4. The point of connection of two chromatids of the chromosome together.
5. Asexual reproduction occurs by different parts of the plant without seeds.

B Mention the properties of the formed image in each of the following cases :

1. An object is put in front of a convex lens at a distance less than its focal length.
2. An object is put at the focus of a convex lens.



C From the opposite figure :



1. Write the name of this phase ?
2. When does this phase happen ?
3. Why does the cell passes through this phase ?

Question 2

A Complete the following statements :

1. Acceleration is considered one of .... physical quantities, while time is considered one of .... physical quantities.
2. .... and .... are used during wars to follow battle.
3. Long-sightedness caused as a result of .... of the radius of the ball thus the retina is .... to the eye lens.
4. The Big Bang theory explain the origin of .... , while the Nebular theory explain the origin of ....
5. Somatic cells are divided by .... , while reproductive cells are divided by ....

B A moving car by a uniform speed covers 80 meters in 4 seconds, then the driver press the brakes, so it stopped after 4 seconds :

Find : The magnitude of the acceleration :

1. Within 1^{st} 80 meters.
2. After pressing the brakes.

C Mention the name of the phase that indicates the following changes during the cell division :

1. Spindle fibers begin to shrink, so two identical groups of chromatids are formed.
2. At the end of this phase, the nucleoeus and nuclear membrane disappear.
3. It occurs when a complete set of chromosomes that have the same number of the mother cells chromosomes, is formed.

Question 3

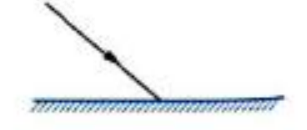
A Choose the correct answer :

1. A student took 10 minute to move from his home to his school moving at average speed 2 m/s, which of the following equals the distance between his home and school ....

   a. 48 m b. 84 m c. 1.2 Km d. 3.6 Km

2. **In the opposite figure :**

   If the angle between the incident ray and the surface of the plane equals 130°, Then the angle of reflection equals to ....

   a. 40° b. 50° c. 90° d. 130°

3. The solar system consists of the Sun and .... plants revolve around it.

a. 7 b. 8 c. 9 d. 10

4. The ratio between the number of chromosomes present in the gametes produced by meiotic cell division to the number of chromosomes present in somatic cell is ....

a. quarter b. double c. third d. half

5. The parental individual disappears when the reproduction occurs in the ....

a. bacteria b. yeast c. bread mould fungus d. mushroom

B The displacement is a vector quantity, which identified by knowing both magnitude and direction. What is meant by :

1. Amount of displacement.
2. Direction of displacement.

C Two cars move in the same direction if the speed of the first car is 30 km/h and the second car is 50 km/h.

Calculate the relative speed of the second car relative to an observer :

1. Standing on the ground.
2. Sitting in the first car.
3. What are you conclude from the resultants ?

Question 4

A Give reasons for :

1. The motion of a train can be considered from examples of motion in one direction.
2. The human being noticed that when he looked at the still water surface, he could see as image of his face in the water.
3. You could see the person who fixes the watches use a magnifier.
4. The constancy of the planets in their orbits around the Sun.
5. The mitosis division is very important for the children.

B Explain how to determine the focal length of a concave mirror (explaining your answer by drawing).

C A body moves in a straight line, and the distances covered in different times is recorded in the opposite table :

The Distance (m)	10	20	30	40	50
The time (s)	5	10	15	20	25

1. Draw the relation between (distance – time) graphically that is obtained from the values shown in the table.
2. Calculate the speed of moving a body.

End